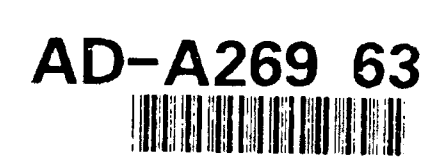

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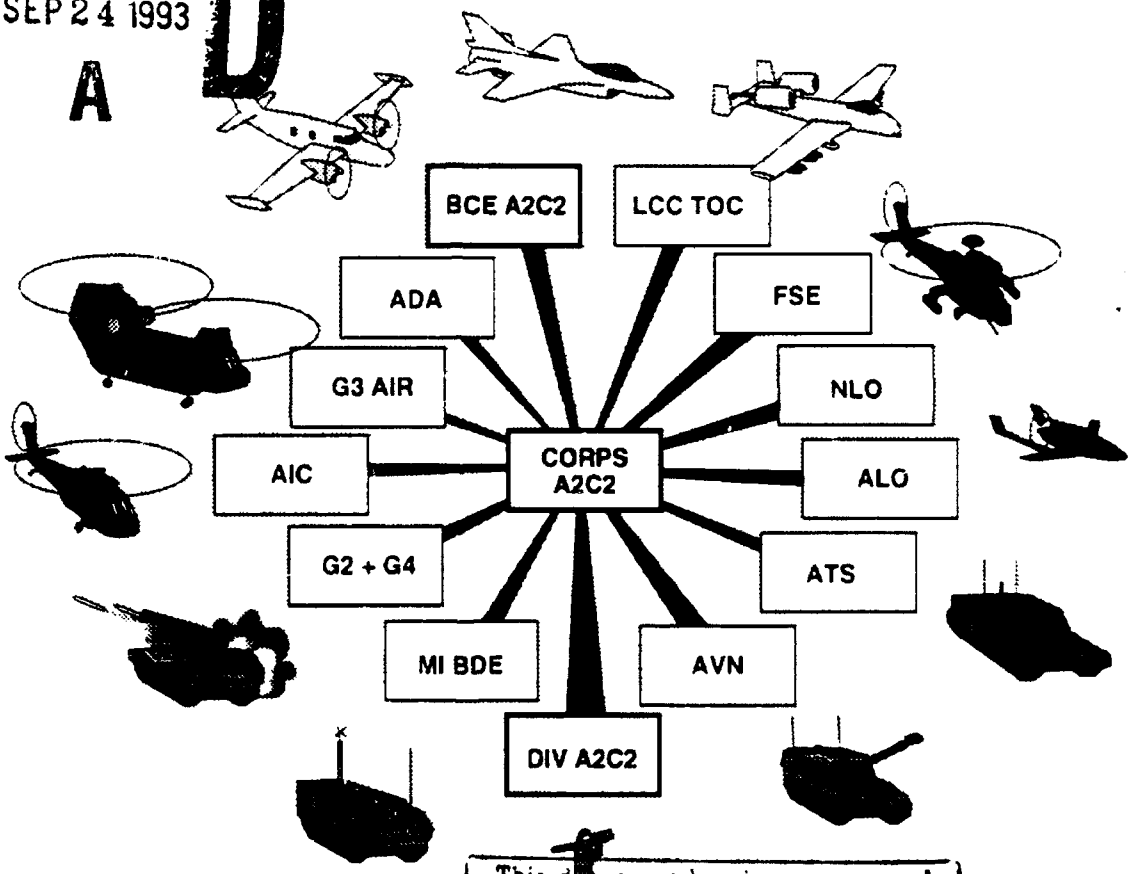
ARMY AIRSPACE COMMAND AND CONTROL (A2C2)



ACTION PLAN

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Plan identifies A2C2 functional deficiencies,defines requirements to correct defiencies,recommends solutions for defined requirements Recommendations categorized into doctrine,training,leader development, organization,materiel,or soldier(DTLOMS)domains. Plan frames study of A2C2 defiencies and solutions within context of post-Cold War force projection Army command and control(FORCPAC2)concept and current doctrine for A2C2 system. Operations Desert Shield/Storms,and projected airspace requirements to support FORCPAC2 establish a need to reevaluate A2C2 operations at all echelons,and to consider effects of these needs in the DTLOMS domains.Plan identifies A2C2 defiencies,which are based on a review of preliminary assessments and doctrinal literature,visits to units,proponents,and materiel developers,and interviews with key personnel.

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**ARMY AIRSPACE COMMAND AND CONTROL (A2C2)
ACTION PLAN FOR ISSUE RESOLUTION**

A2C2 ACTION PLAN
TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

This plan identifies Army airspace command and control (A2C2) functional deficiencies, defines requirements to correct the deficiencies, and recommends solutions for the defined requirements. The recommendations are categorized into doctrine, training, leader development, organization, materiel, or soldier (DTLOMS) domains.

This plan frames the study of A2C2 deficiencies and the proposed solutions within the context of the new post-Cold War Army force projection Army command and control (FORCPAC2) concept and the current doctrine for the A2C2 system. Operations Desert Shield/Desert Storm, and projected airspace requirements to support the FORCPAC2 concept, establish a need to reevaluate A2C2 operations at all echelons and to consider the effects of these needs in the DTLOM domains.

This plan identifies A2C2 deficiencies, which are based on a review of preliminary assessments and doctrinal literature, visits to units proponents and materiel developers, and interviews with key personnel. The issues and their recommendations that are identified in this plan, shown in short form, are --

Issue Doctrine-1 (D-1): There is a lack of an A2C2 concept that supports the land component commander's current airspace coordination, integration, regulation, and identification requirements.

Recommendations: HQ, U.S. Army Training and Doctrine Command (TRADOC) and Command and General Staff College (CGSC) should lead development of a revised A2C2 concept as a precursor for revised A2C2 doctrine. The new concept should address changed Army aviation missions and roles, new or revised airspace management control measures, required brigade and battalion

functions in terms of capabilities, people, and equipment, new or revised requirements for all branches in support of A2C2 missions and functions, and A2C2 automation and communications requirements.

Issue D-2: Current A2C2 doctrine does not support joint doctrine for theater operations, including the operational and tactical requirements of FORCPAC2. There is confusion as to what is the capstone A2C2 doctrine.

Recommendations: HQ, TRADOC should identify FM 100-103 as the A2C2 capstone doctrinal manual, and designate Air Land Sea Application (ALSA) Agency manuals as tactics, techniques, and procedures (TTP) manuals under FM 100-103. CGSC should revise FM 100-103 to address A2C2 under the FORCPAC2 concept and include the TTP for joint and combined operations, as well as the unique requirements for interagency operations and operations other than war.

Issue D-3: Current A2C2 doctrine does not provide the TTP for integrating and synchronizing fire support, air defense, intelligence collection, unmanned aerial vehicles, aerial electronic warfare operations, and special operations forces with A2C2 at all echelons.

Recommendations: CGSC should include appropriate TTP in the programmed revision of FM 100-103. The revision should also include use of information provided by portions of the air tasking order (ATO), air control order, and ATO special instructions.

Issue Training-1 (T-1): There is a lack of adequately trained A2C2 personnel. A2C2 training requirements are not quantified in the training management system.

Recommendations: Combined Arms Command, Combat Developments (CAC,CD) should assume proponency for revised

additional skill identifiers (ASIs) that identify specific A2C2 skill requirements, and code tables of organization and equipment (TOEs) with these new ASIs. Combined Arms Command, Training (CAC-T) should update A2C2 performance tasks, review the content of affected branch, functional, and professional development courses accordingly, and certify Air Ground Operations School (AGOS) training for new ASIs.

Issue T-2/Materiel-1 (M-1): There is a lack of adequate A2C2 play in Army exercises.

Recommendations: National Simulation Center (NSC) should identify A2C2 simulation requirements; determine the viability of current manual workarounds for simulations; prepare software engineering change proposals for current simulations; and submit A2C2 simulation requirements for new simulations. CAC-T should program A2C2 training for Battle Command Training Program (BCTP) controllers.

Issue T-3/Leader Development-1 (L-1): There is a lack of appropriate emphasis on A2C2 training.

Recommendations: CGSC should lead review and revision of professional development courses, based on current A2C2 performance requirements. CGSC should direct that Command and General Staff Officer Course (CGSOC) students in combat arms branches attend a revised Advance Fires elective that includes current A2C2 objectives; require that combined arms commanders in Pre-Command Courses (PCCs) attend revised Tactical Commanders Development or Army Warfighter courses that include A2C2 objectives; emphasize A2C2 in current PCC and Division Commanders/Assistant Division Commanders Course; and encourage senior officer attendance at the AGOS Senior Theater Battle Commanders Course. CAC-T should ensure review and revision of proponent mission training plans for A2C2 objectives.

Issue Organization-1 (O-1): There is an insufficient number of A2C2-qualified personnel positions in units at echelons of corps and below.

Recommendations: CAC,CD should add augmentation to corps headquarters TOE for liaison officers (LNOs) with A2C2 qualifications to the battlefield coordination element (BCE); adjust TOEs at division and above for staffing continuous A2C2 operations; review air defense and field artillery procedures that document and fill LNO positions for applicability to A2C2 LNO requirements; and initiate agreements with proponents for filling A2C2 positions and stabilizing personnel, once assigned, in those positions.

Issue O-2: There is inadequate staff (number and qualifications) in the BCE airspace management section to conduct continuous operations in a joint environment across the operational continuum. Army force (ARFOR) A2C2 staffing inadequacies contribute to the workload directed to the BCE airspace management section.

Recommendations: CAC,CD should revise the BCE TOE to provide a military intelligence aviator, add air traffic control (ATC) noncommissioned officer (NCO) positions, and provide a communications NCO. CAC,CD should also review ARFOR A2C2 staff capabilities.

Issue O-3: There is no formal A2C2 organizational element at brigade and below to support the commander's use of the third dimension (height) of battle space.

Recommendations: The revised A2C2 concept (issue D-1) should identify maneuver brigade/battalion requirements and responsibilities for airspace control in the close battle area. CAC,CD should lead a review of A2C2 functions at maneuver brigade

and below; authorize equipment necessary to support these functions in TOEs; and integrate A2C2 automation requirements in the concept for battalion and below command and control (B2C2).

Issue M-2: There is a lack of effective communications and automation capabilities to support A2C2 requirements for systems integration at all echelons.

Recommendations: CAC,CD should facilitate the standard theater army command and control system (STACCS) and maneuver control system (MCS) interfaces with the Air Force's contingency theater air control system (TACS) automated planning system (CTAPS); and analyze operational requirements for interfacing STACCS/MCS with the Navy joint maritime command information system (JMCIS). PM-OPTADS should lead A2C2 automation and communications equipment improvements.

Issue M-3: The capabilities of the Army tactical command and control system (ATCCS) are not fully utilized to support A2C2 system requirements.

Recommendations: CAC,CD should expedite ATCCS architecture capabilities to support A2C2 applications, and assign a high priority to development of supporting integration software.

Issue M-4: BCEs lack communications and automation capabilities critical to the support of air and land component interfaces in joint operations.

Recommendations: CAC,CD should develop and document communications and automation requirements of the BCE, and provide MCS to the BCE pending fielding of STACCS.

Issue M-5: Lack of real-time position location information capabilities to support corps and division maneuver

commanders may adversely affect their airspace management functionality.

Recommendations: CAC,CD should develop organization and equipment requirements to support the A2C2 system with real-time position information; develop requirements to equip Army airspace users with position/location devices; and develop the supporting common software capability to integrate inputs from all airspace users in a real-time environment.

Issue All DTLOMS: There is a need to incorporate A2C2 issues in all of the battle labs.

Recommendations: HQ, TRADOC, should incorporate capabilities assessment of A2C2 in all battle labs; incorporate the A2C2 concept into Louisiana Maneuvers; review A2C2 concept and ensure each battle lab has considered A2C2 in its battlefield capabilities assessment.

Annex A contains the detailed issue sheets that establish the requirements to resolve the identified A2C2 deficiencies. Each issue sheet establishes responsibilities and time frames for satisfying the requirement.

SECTION I
INTRODUCTION

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INTRODUCTION

1.1 INTRODUCTION

The Army's keystone doctrinal manual, FM 100-5, *Operations*, June 1993, states that, in a force projection Army, planning and conducting combat operations at both the tactical and operational levels will require that commanders relate their forces to one another and to the enemy in purpose, time, resources, and space within a battlefield framework. To understand and visualize how he will employ his forces in this framework, the commander must understand the relationship of the area of operations (AO), battle space, and operations in depth. Within a theater of operations, the AO is defined by geographical lateral, rear, and forward boundaries, and the airspace above. Battle space is a physical volume comprising breadth, depth, and height in which the commander positions and moves assets over time to acquire and engage the enemy, and includes the operational dimensions of time, tempo, and synchronization. Operations in depth represent one of the three sets of closely related activities characterizing operations within the AO--deep, close, and rear operations.

Army commanders must be capable of fighting close, deep, and rear actions, attacking throughout the depth of the battlefield framework and massing forces and capabilities when and where necessary, so that the action appears to the enemy to be one continuous operation. When conducting operations in a joint environment, capabilities of other members of the joint team are also used to accomplish these attacks. Because the lines between these deep, close, and rear actions may be transparent and will often shift, fighting within this framework requires constant synchronization.

Close operations are those that corps and divisions with forces in immediate contact with the enemy in the offense or the defense usually conduct; this includes the battles brigades and battalions fight. The concept of close operations may be applied to a wide range of combat situations, and characteristically emphasizes the employment of ground forces as the dominant maneuver element. Dispersal, concentration to achieve decisive results, and subsequent redispersal exemplify the commander's use of forces.

Deep operations are those directed against the enemy forces and functions beyond the close battle, and are executed at all levels with maneuver and supporting fires. They expand the battlefield framework in space and time to the full extent of friendly capabilities, and affect the enemy through either attack or threat of attack. The integrated application of the Army's maneuver and firepower capabilities makes the deep attack effective against the enemy's command and control (C2), combat forces, and logistics infrastructure. Airborne and air assault forces, attack aviation units, high-speed armor forces, fire support units, and logistic support elements provide the land component commander and joint force commander with the capabilities to conduct deep thrusts against the enemy forces in individual actions or simultaneously with close operations. Successful deep operations require the synchronization of all resources, including systems organic to Army echelons and those of other services or allied forces.

Rear operations sustain the current close and deep operations and posture the force for future phases of the campaign. They provide continuity of operations, logistic support, and battle command.

The ability of the commander in the force projection Army to conduct close, deep, and rear operations in future combat will require an increase in the effectiveness of synchronization at the operational and tactical levels in a theater of operations. At the

tactical level, all operations will require the dynamic synchronization of maneuver and firepower as complementary elements for success in combat. Joint and combined operations will place further demands on the commander to synchronize the planning and conduct of the battle within his battle space. This need for synchronization as an operational dimension has no greater importance than when it is applied to the third physical dimension of the battle space--height, or airspace.

To effectively, safely, support the commander during combat operations, his use of airspace requires timely, accurate coordination and communication among all users. The commander's staff must integrate and synchronize air defense, aviation, electronic warfare, fire support, intelligence, and maneuver elements so that they realize the full potential of their synergistic capabilities in this third dimension. The Army airspace command and control (A2C2) system must accomplish these airspace coordination, integration, regulation, and identification functions within the Army's (or land component commander's) AO in the theater of operations. The staffs of units up through theater army level must ensure that the system is responsive to the commander's operational requirements.

To support the commander's requirements, the A2C2 system and its underlying concept must be updated to meld it with the tenets, principles, and command and control systems that will function under the force projection Army command and control (FORCPAC2) concept. It must possess the necessary data and communications interfaces with joint and allied forces employed within the area of operations.

1.2 PURPOSE

This A2C2 Action Plan verifies previously identified A2C2 functional deficiencies and shortcomings, identifies additional issues, defines requirements for their resolution, and recommends solutions. The plan categorizes the identified deficiencies, shortcomings, and related issues into the domains of doctrine, training, leader development, organization, or materiel (DTLOM) as a means to effect their resolution.

1.3 BACKGROUND

The Army's February, 1993, A2C2/Air Traffic Service (ATS) conference, working-level meetings, and observations of unit performance in the Battle Command Training Program (BCTP) identified numerous issues affecting the effective, efficient implementation of the A2C2 requirement. Subsequently, visits to battlefield functional area (BFA) proponents, operational units, and training, simulation, and materiel development support agencies expanded these issues. This action plan is the result of the overall effort to identify the A2C2 deficiencies and propose solutions.

1.4 ORGANIZATION

The A2C2 Action Plan contains an Executive Summary and five sections. This Section introduces the plan. Section II describes the FORCPAC2 concept. Section III presents the current A2C2 system. Section IV identifies A2C2 functional deficiencies within each of the DTLOM domains. Based on the identified deficiencies, Section V defines the A2C2 requirements and references issue sheets (at Annex A) that recommend solutions, estimate required resources, and establish milestones for the resolution of each deficiency (issue).

1.5 MANAGEMENT

Quarterly in-process reviews (IPRs) will be held by CAC, CD to assess progress in resolving each issue in the action plan. Initial IPRs are scheduled for mid-November 1993 and mid-February 1994. Addressees will be notified of the specifics for these and subsequent IPRs.

CAC will schedule general officer reviews as needed. The first such review is tentatively scheduled for February or March 1994.

SECTION II
FORCE PROJECTION ARMY COMMAND AND CONTROL (FORCPAC2) CONCEPT

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FORCE PROJECTION ARMY
COMMAND AND CONTROL (FORCPAC2) CONCEPT

2.1 INTRODUCTION

The 1990's Army must live, train, and fight in a new world, a world of high technology, fragmented threats, new roles, and decreased defense budgets. This post-Cold War Army will use FORCPAC2 as its command and control (C2) concept in fulfilling the National Military Strategy--which focuses on crisis response and force projection.

The FORCPAC2 concept originated from an abbreviated U.S. Army Training and Doctrine Command (TRADOC) Command and Control Functional Area Assessment (C2FAA) for the Spring, 1992, Program Objective Memorandum (POM) addendum. This assessment developed into a complete study of the post-Cold War C2 environment. A U.S. Army Combined Arms Command (CAC) task force, representing the TRADOC and CAC commanders, used emerging developments in doctrine, inputs from other studies and professional symposia, and command, staff and field unit reviews as guidance in designing the concept. Further, the TRADOC and CAC commanders established the following specific guidance for command, operations, threat, and information:

- Command guidance directed that C2 networks be commander-centered and command-supporting for the battle commander's use.
- Operational guidance directed that the study focus on the dynamic nature of future battlefields and the need for C2 during mobile operations.
- The threat guidance is no longer focused on the Warsaw Pact and European plains scenarios.

- Information guidance emphasized the necessity of an economy of data distribution on the battlefield.

The task group obtained C2 inputs from proponents for battlefield operating systems (BOSs) and reviews of communications systems from the U.S. Army Signal Center (USASIGCEN). Also, under the guidance of the program executive officer (PEO) for communications, all PEOs and project managers (PMs) associated with C2 systems identified and presented technological enhancements that the Army could quickly apply to improve command, control, communication, computer, and intelligence (C4I) systems.

The current FORCPAC2 concept, therefore, has resulted from Army-wide review and input. FORCPAC2 not only establishes the concept, but entails an action plan for implementing the results of the study.

Changing domestic and political conditions will critically affect the forward-deployed resources that, historically, the Army has had available to its missions abroad. Projection of forces that include a heavier mix of reserve rather than active components will be more prevalent. The investment in extant warfighting assets will continue, but only at reduced defense levels.

Considering these immutables, the C2 modernization challenge is tremendous but certainly within reach. FORCPAC2 reflects the background, methodology, context, and environment that sets the stage for the transition of the C2 vision from Cold War anachronisms to new force-projection paradigms.

2.2 THE FORCPAC2 CONCEPT

2.2.1 Force Projection Army

The changing international and domestic environments have dictated a reassessment of U.S. military strategy. In the past, a larger U.S. military structure has had significant forward-deployed forces--primarily in Europe. Today's strategic reassessment calls for a smaller military strength with significantly fewer forward-projected forces. The strategy now centers on projecting U.S. military forces from the United States as necessary to meet national strategic goals. This refocused strategy presents significant new challenges--not the least of which is the need for a robust joint command and control system to keep pace with the new force-projection strategy.

Force projection operations usually begin as a rapid response to a crisis somewhere in the world. Command and control is critical for operational and tactical commanders during all phases of such an operation. Operational commanders must provide an extra level of security for tactical units while lower-level commanders build combat power and prepare for future operations.

FM 100-5, *Operations*, 12 June 1993, describes the general flow of force projection activities or phases. These phases may overlap. Commanders and units must be prepared to deal with these activities, both simultaneously and in sequence.

The sequential flow of force projection operations is--

- Predeployment
- Mobilization (if necessary)
- Deployment
- Entry
- Conduct of the operation

- Redeployment
- Demobilization.

2.2.2 Post-Cold War Command and Control (PCWC2) Imperatives

On the modern battlefield, a myriad of functions--including joint and possibly combined operations--are ongoing simultaneously. To support the force-projection concept on such a battlefield, the Continental United States (CONUS)-based force projection Army needs an uninhibited transfer of information to fight and win. This requires new thoughts and ideas about C4I. The PCWC2 imperatives of strategic deployability, global connectivity, and battlefield agility establish the framework for the C4I thought process.

Interoperability of C4I systems among all friendly forces is necessary to provide the necessary global connectivity and battlefield agility. To work more effectively across the broad range of forces--including active and reserve components, and joint, allied and coalition partners--the Army must establish standards-based, commercial, open architectures for C4I systems. The following initiatives are essential to prosecute the PCWC2 imperatives successfully.

2.2.2.1 C2 For Mobile Operations (C2FMO)

C2FMO will give commanders the ability to communicate with their forces at any time and from any place while either on the move or at a halt on the battlefield. C2FMO eliminates the requirement to make frequent stops at stationary command posts (CPs) to obtain situational updates. The C2FMO concept is evolving in several ways, as described in the following paragraphs.

2.2.2.1.1 Commander's Requirements for C2FMO. The commander, his staff, and the supporting C2 system must provide effective command

and control for mobile operations. The commander, to do this, requires accurate, timely, pertinent information to make informed decisions quickly. Untimely decisions, based on inaccurate and outdated information. may affect the momentum of battle by decreasing agility and mobility. In fluid situations, commanders must be free to move about on the battlefield and influence the action; their need for the information by which they can influence the action must not tie them down at a CP.

The C2 system, therefore, must furnish the commander, whether stationary or on the move, with a constantly refreshed situational display, with enough information to--

- Provide leadership/motivation
- Provide intent/focus
- Provide mission guidance
- Make decisions
- Assess/influence situations
- Prioritize actions and resources
- Assess risk
- Visualize the future state
- Anticipate change
- Formulate concepts and operations
- Select critical places and time.

2.2.2.1.2 Warfighter Net. Lessons learned from Operation Desert Storm and the PCWC2 analysis validate the need for senior tactical commanders to operate in a net with the same characteristics as the old frequency modulation (FM) command net, now called the Warfighter's net.

The Warfighter's net links corps, division, and adjacent organizational commanders and their CPs. The net gives the commander--

- Immediate access to key CPs--objectively, while on the move during mobile operations
- The ability to monitor subordinate units' communications nets
- The capability from any location on the battlefield to affect operations during critical movements of the fight.

2.2.2.1.3 Forward/Rearward Command Post (CP) Configuration. Operations Just Cause and Desert Storm were highly instructive. They illustrated that CPs have too much "stuff"; the CPs are out of actior. while moving; main and rear CPs seldom, if ever, move; and CP vehicles are too slow and generally inadequate for mobile operations. PCWC2 thinking is that mobile CPs, about the size of the current tactical (TAC) CP, should be electronically tethered to a main-type CP that is static. This establishes a forward/rearward concept rather than the TAC, main, and rear CPs that current doctrine requires. Figure 2-1 depicts multiple echelon forward/rearward CPs.

Forward and rearward CPs would replace the current triumvirate of CPs.

The Forward CP is to conduct these functions:

- Close operations
- Limited intelligence production and analysis
- Limited planning, coordination, and analysis
- Synchronization of close and deep operations.

The forward CP operates in the combat zone and is electronically linked to the rearward CP by mobile subscriber equipment (MSE), combat net radio (CNR), and tactical satellite (TACSAT). This link ensures that the commander has access to the information needed, regardless of location.

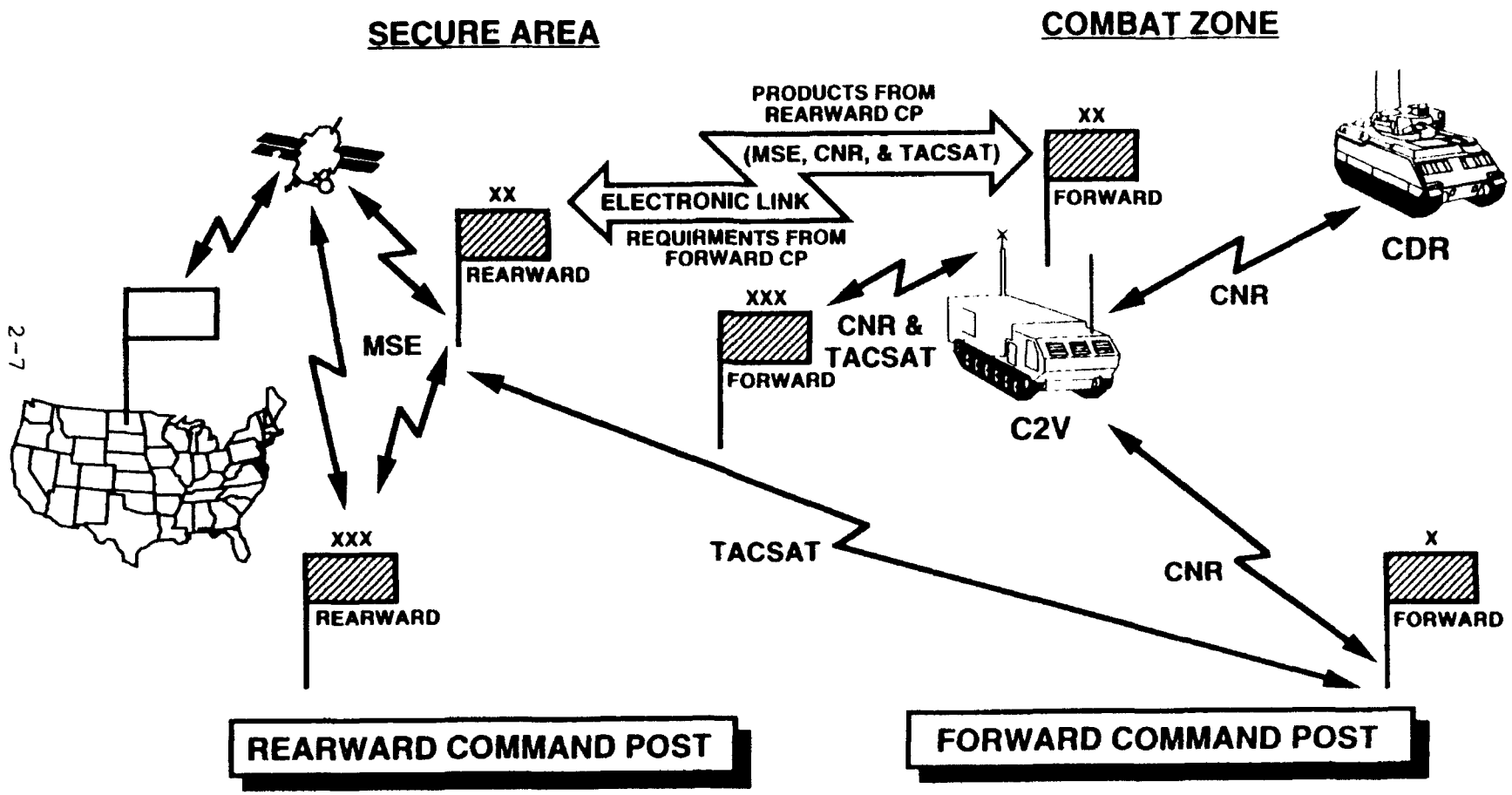


Figure 2-1. Forward/Rearward CP Configuration

The rearward CP, which would be relatively static, conducts the following functions:

- Controls rear operations
- Synchronizes rear operations with both the close and deep operations
- Accomplishes detailed planning, coordination, and analysis
- Provides robust intelligence and logistics planning
- Acts as an information repository.

The rearward CP operates in a secure area. It uses satellites to access intelligence and logistics data from various agencies and activities in CONUS. It pushes products forward and receives requirements from the Forward CP through an electronic link. The rearward CP can transmit data directly to any forward CP in the area of operations.

2.2.2.1.4 Split-Base Planning and Operations. The concept of split-base operations arose because of the heavy volume of information flooding the existing communications pipes and the large amounts of data collected on storage media and available for transmission. Storage media is bulky; its added weight slows mobility. No longer is it either efficient or necessary to move complex, cumbersome automation centers into an operational area. Such centers can remain in the CONUS with a seamless communication architecture (see 2.2.2.2) tethering them to the operational area. The information system is a "pull" system. Data bases are maintained in CONUS; a user makes a request and "pulls" forward only that data needed for immediate operations. Logistics and intelligence operations are good candidates for the split-base concept. Also, combat units can conduct some operational planning in the rear and transmit forward only that data needed for close

operations. This concept allows primary dedication of the automation equipment in theater to C2 analysis and support.

2.2.2.1.5 Command and Control Vehicle (C2V) and Commander's Vehicle (CV). Commanders, particularly at brigade and below, generally rely on FM radio to communicate guidance, orders, and instructions to subordinates when personal contact is not otherwise possible. Commanders at higher echelons have similar needs, except they operate over a larger area and need more robust communications support. They need to maintain contact with more distant subordinates, superiors, and flank organizations. They must be able to assess the situation and influence the outcome of the battle without regard to their location. A new family of vehicles would provide each commander and staff with access to on-line data while they are on the move or during a short halt. The C2V is being designed to support the stationary or mobile staff as a maneuver CP. These vehicles will be found at the brigade, division, and corps TAC CPs; the brigade main CP; and the battalion tactical operations centers (TOCs) and administrative-logistics centers (ALOCs).

The C2V has these desired capabilities:

- Interoperations with ATCCS computers in a wireless mode
- Communications that include: MSE, CNR, TACSAT, MSE facsimile, and high frequency (HF) radio
- Self-contained power
- Quick-erection antenna with multiplexer
- Situational awareness capability
- Satellite tracking antennas that work while on the move.

In the heavy division, the C2V will be mounted on a multiple launch rocket system (MLRS) chassis; a light division will

use a high mobility multipurpose wheeled vehicle (HMMWV) with a trailer.

The CV has the same desired capabilities as the C2V and carries the commander and selected staff. There also are heavy and light variants of the CV.

The commander will not carry a lot of data around the battlefield, but will have access to data at either the forward or rearward CP.

2.2.2.1.6 Airborne Command and Control (ABC2). The size and tempo of the battlefield require an airborne C2 system for the commander and selected staff (Figure 2-2). There are three configurations of the ABC2 console, one each for--

- Corps and division commanders
- Maneuver brigade commanders
- Aviation brigades for deep strike missions.

ABC2 consoles have these capabilities:

- Provide situational awareness
- Work in the air and on the ground
- Provide rapid transit
- Provide eavesdrop capabilities while enroute
- Provide robust communications packages.

2.2.2.1.7 Situational Awareness. Knowing where you are and where the enemy is, and fratricide avoidance are the key elements of situational awareness. One of the undisputed winners coming out of Desert Storm was the global positioning system (GPS). The integration of GPS with the CNR gives friendly situational awareness to leaders of units that are so equipped. Further possible development may combine the locations that the integrated

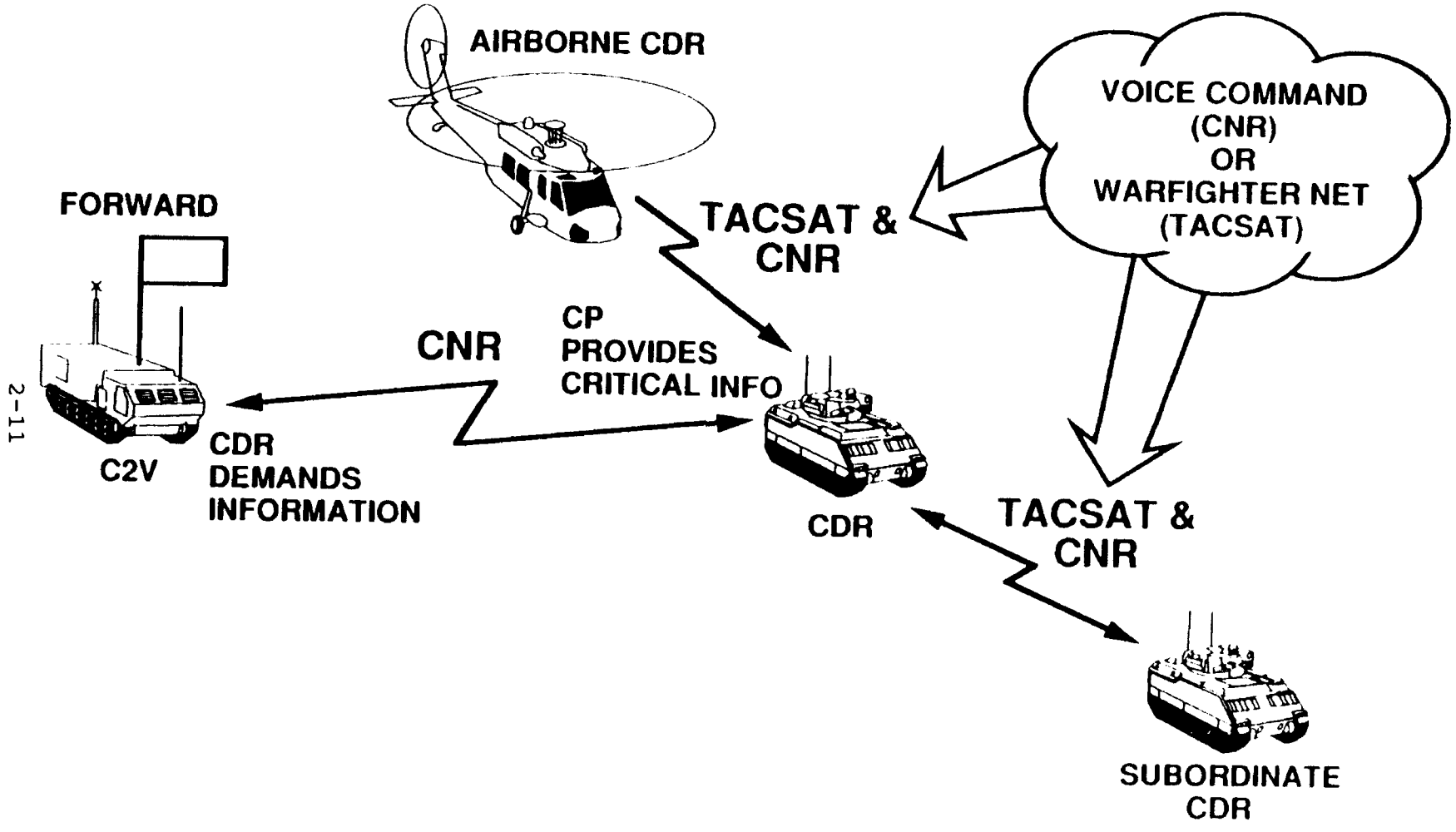


Figure 2-2. Airborne Command and Control (ABC2)

GPS/CNR furnish with the Maneuver Control System (MCS) display to provide near real-time friendly situational awareness throughout the battlefield. This link could also provide enemy order of battle. Integrating this with a weapons system and combat identification system would further enhance this capability.

2.2.2.2 Seamless Communications Architecture

One of the keys ensuring success of the Force Projection Army is the ability to pass information effortlessly from gateway centers in the United States to tactical users in the operational theater. The seamless communications architecture is transparent to the user and consists of automated gateways, protocols, and standards that do not discriminate among the available communications systems. The communications architecture has five components:

- Satellite communications (SATCOM)
- Broadcast
- Area common user system (ACUS)
- Combat net radio (CNR)
- Army Data Distribution System (ADDS).

In the area of SATCOM, more access and greater capability is needed to support the force projection Army and split-base operations. Use of both military and commercial satellites will assure adequate communications.

Broadcast services harness technology to pass critical, time-sensitive information directly to multiple warfighter's CPs. Current plans are to use broadcast services for weather, and possibly logistic data, in addition to intelligence information.

The MSE was a winner during Desert Storm. It should be enhanced to provide a speaker, global data base, and conferencing capability.

In the area of CNR, SINCGARS also proved its utility during Desert Storm. Its fielding must continue until the total force is equipped.

The ADDS consists of the Joint Tactical Information and Distribution System (JTIDS), and the Enhanced Position Location and Reporting System (EPLRS). The Air Defense School is auditing data distribution requirements to ensure that the existing architecture is adequate.

2.2.2.3 Automation Supporting the Force

Strategic, operational, and tactical commanders require a common pool of data, tailorable to their needs, that provides a common picture of the battlefield (Figure 2-3).

Interoperability between the Army Worldwide Military Command and Control System (WWMCSS) Information System (AWIS), the Standard Theater Army Command and Control System (STACCS), the Army Tactical Command and Control System (ATCCS), and joint systems is a must. This is achievable using standards based upon open-system architectures. In addition to software interoperability, communications interoperability is needed to efficiently pass information from where it is to where it is needed.

2.2.2.4 Automation Supporting the Commander

Tactical commanders require force-level information (FLI) from common data bases--which are tailorable to their needs--that provide a common picture of the battlefield (Figure 2-4). Using their specific commander's critical information requirements

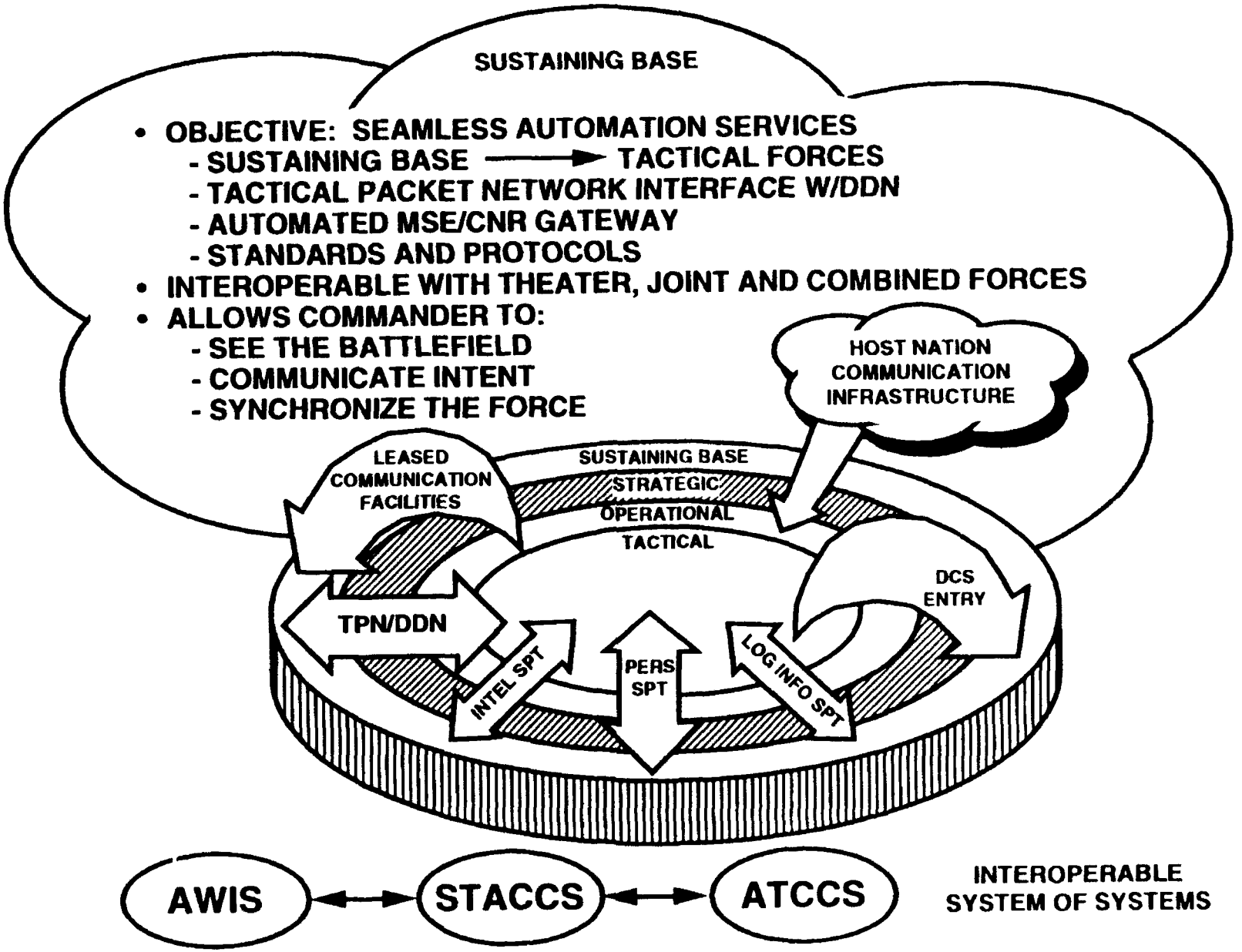


Figure 2-3. Automation Supporting the Force

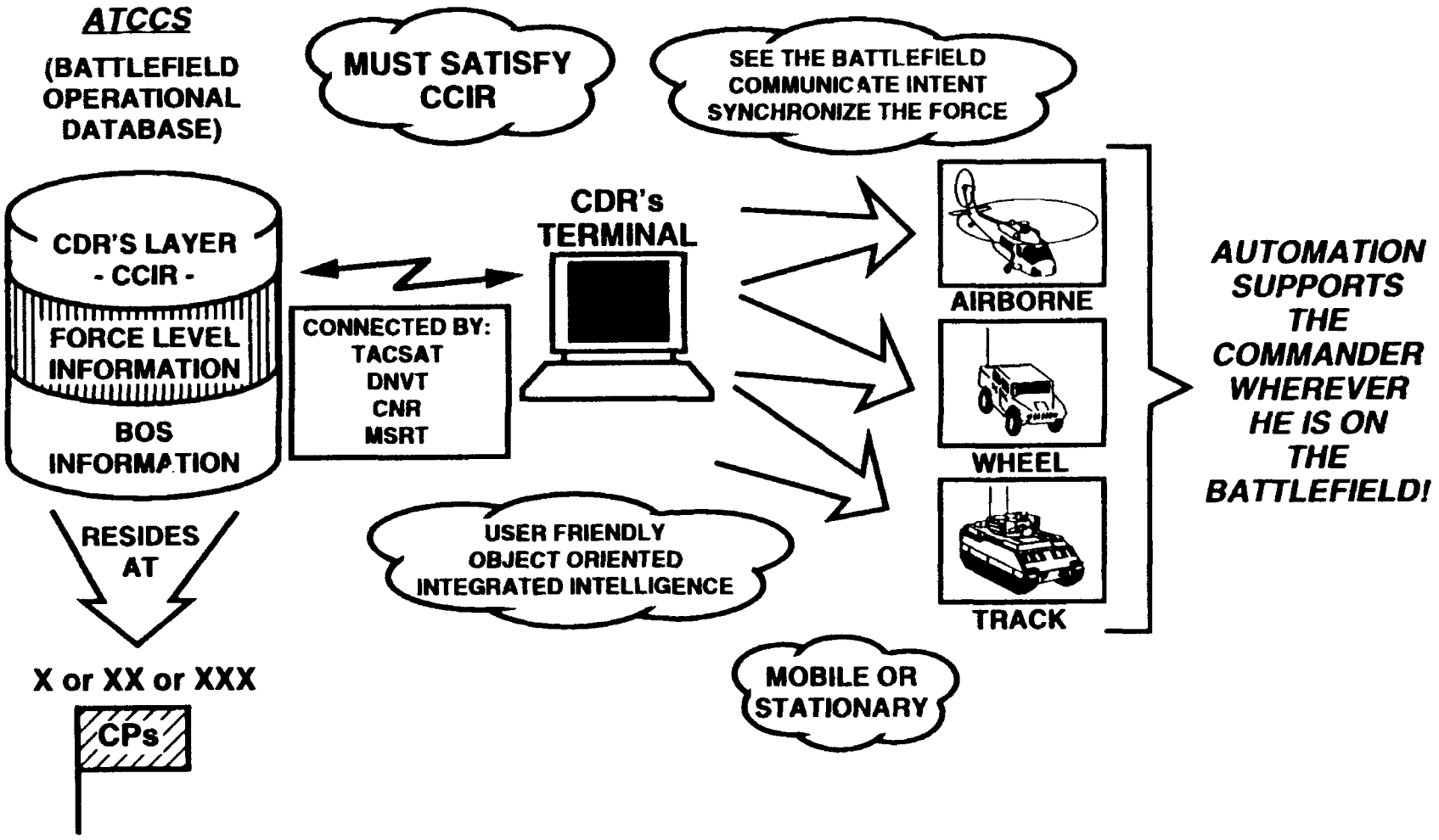


Figure 2-4. Automation Supporting the Commander

(CCIR), force-level information, and input from other BOSs, commanders assimilate the information they need to visualize the battlefield and apply direction.

2.2.2.5 Broadcast Intelligence/Targeting/Dissemination

Broadcast technology permits dissemination of information to selected users simultaneously rather than through a series of hierarchical retransmissions. This allows users to process data and to decide-detect-deliver much faster.

The centerpiece for intelligence dissemination and targeting is the common ground station (CGS).

Located at corps, division, and brigade, the CGS will integrate intelligence from several sources, consolidates systems and functions, and provide--

- Target coordinates
- Video imaging
- Moving target indicators
- Primary and secondary digital imaging
- Radar information.

The CGS will be housed in a C2V and located in close proximity to the maneuver unit CP (forward). This allows the targeting officer to link his terminal to CGS information through automated interfaces and reduces the sensor-to-shooter time lapse.

2.2.2.6 Logistics Split-Base Operations

Logistics split-base operations are a means of providing materiel management support to corps and division forces regardless of where they are located. To do this, part of the materiel management center (MMC) remains in a secure sanctuary (out of

harm's way) location, while a force projection MMC element deploys to the area of operation along with the force it is supporting. The deployed MMC elements consist of personnel and equipment in modular components which provide a conduit for electronic transmission of logistics data, messages, and voice communications traffic. The rear MMC continues to support the stay-behind force while concurrently interfacing with the deployed MMC elements to provide the required support forward. With assured communications and automation, the forward deployed MMC is able to interface back to the supporting MMC.

Supporting the force in the post-Cold War environment also requires that the Combat Service Support Control System (CSSCS) stay synchronized with the C2 systems. To reduce the number of combat service support (CSS) automated systems and improve the common picture of the battlefield, the Standard Automated Management Information System (STAMIS) must be integrated with the CSSCS at each echelon.

2.2.3 Fielding of the Army Tactical Command and Control System (ATCCS)

Lessons learned during operations Desert Shield and Desert Storm affirm the need for automation and for efficient exchange of information at all levels of command.

The force projection Army envisions ATCCS as a smaller, faster, and more user-friendly tactical level system that is fully interoperable with the automated systems at the operational level, and through them, with the strategic level (Figure 2-5).

As the system continues to mature, redesign and adjustment of the architecture will be accomplished to support the

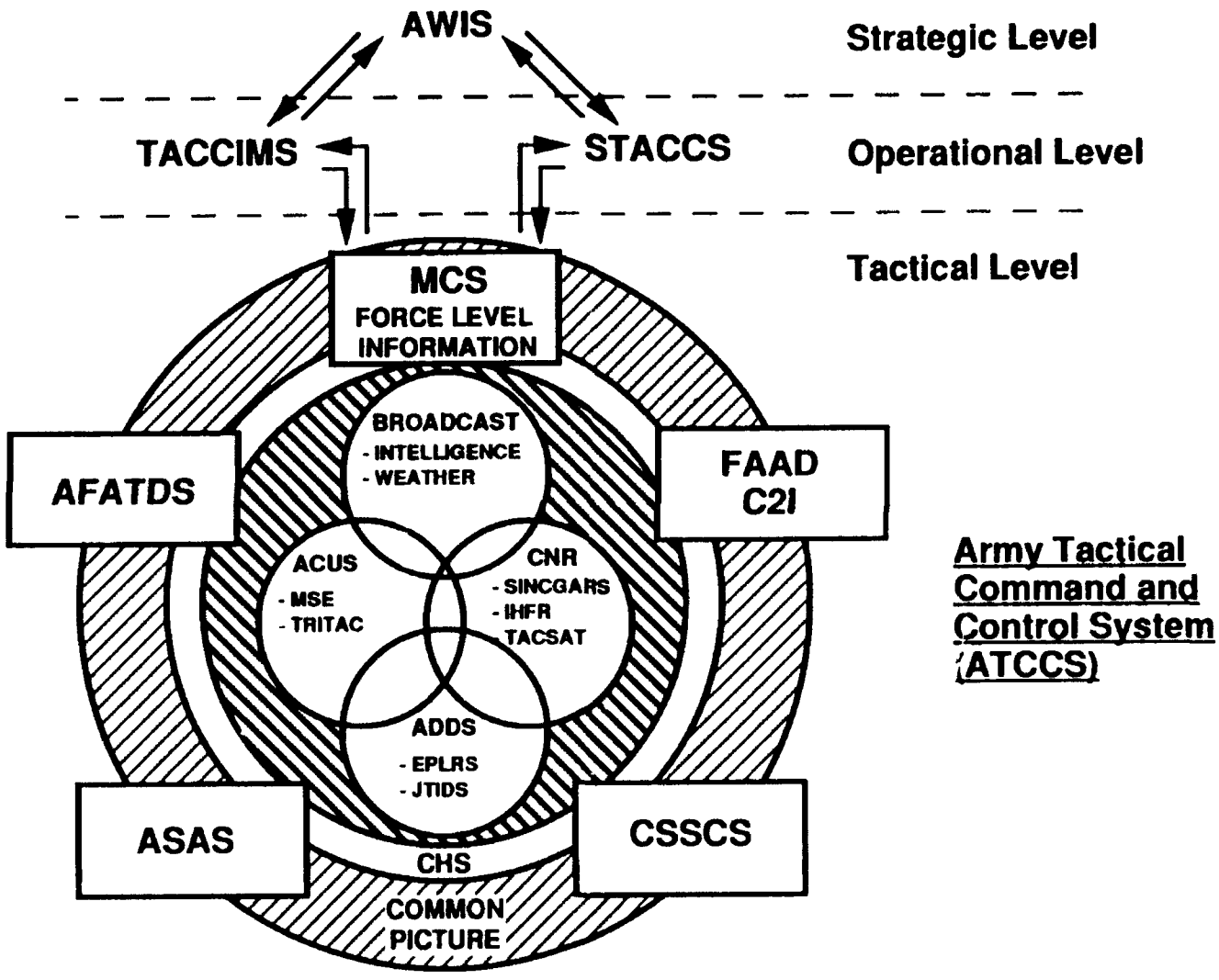


Figure 2-5. Army Tactical Command and Control System (ATCCS)

force projection Army. This includes reducing systems, and making changes to the common hardware and software (CHS) and communications architectures. Such changes will include--

- Enabling operation on the move for critical users
- Reducing the scope of the MCS architecture
- Adding simultaneous broadcast of intelligence down to brigade for targeting
- Adding real-time situational awareness
- Developing and fielding block FAADC2I
- Integrating CSSCS and STAMIS fully
- Maximizing the use of lighter and smaller components
- Ensuring rapid C2 technology insertions
- Fielding SINCGARS to the entire force
- Developing the next generation of the improved high frequency radio (IHFR) with automatic link establishment (ALE) for selected users
- Integrating broadcast services into communications architecture.
- Assuring access to space-based assets.

A common picture of the battlefield with situational awareness and force control information based on the CCIR is a must to support the commander's needs.

As ATCCS matures, continued emphasis is necessary to ensure interoperability between systems and subsystems and joint and Allied systems (Figure 2-6).

The integration of subsystems contributes more and more to the information pool available to the commander. Continual emphasis is needed to keep the architecture robust, the implementation austere, and still fulfill the commander's needs.

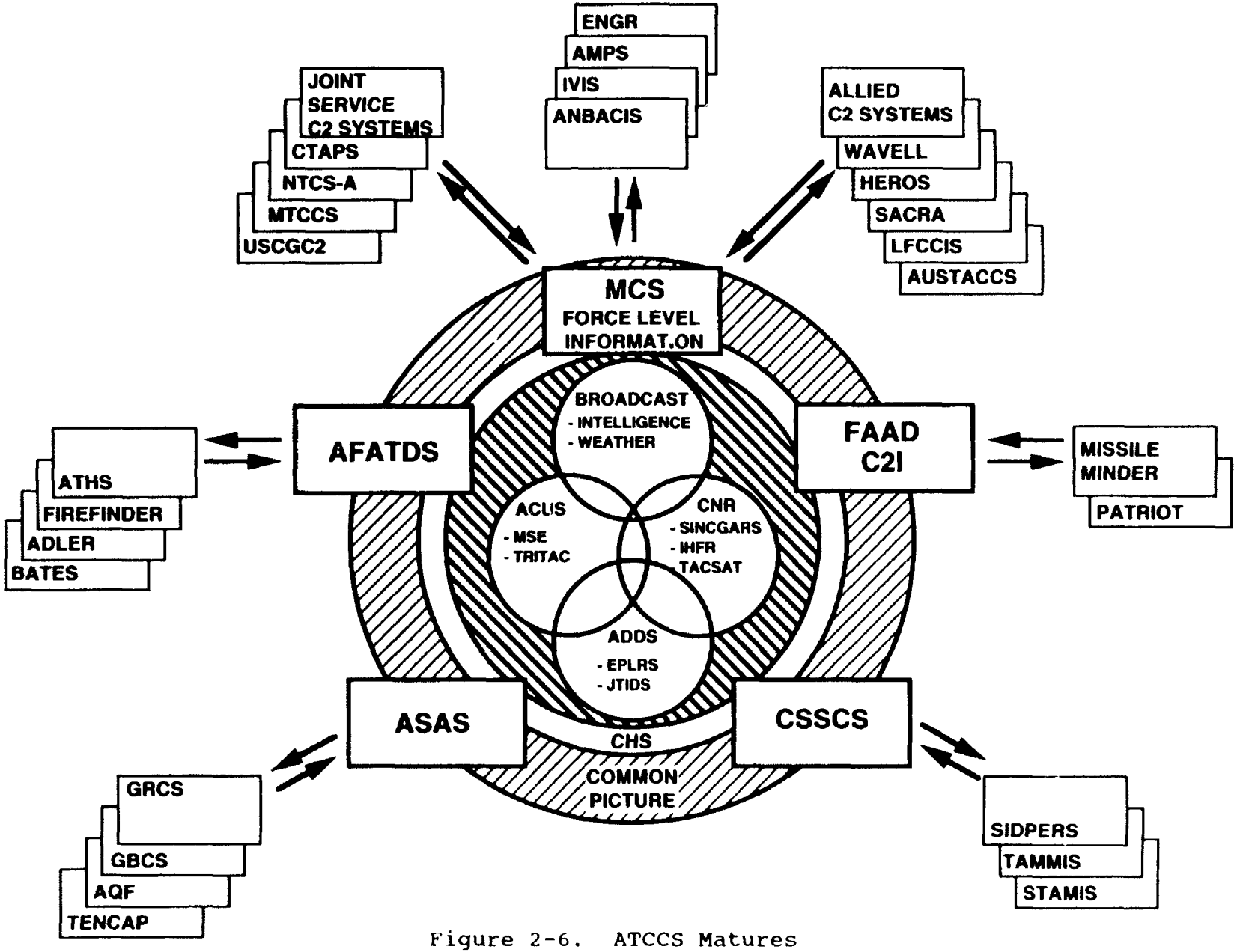


Figure 2-6. ATCCS Matures

Revised ATCCS automation and communication concepts for the force projection Army must allow command and control from anywhere on the battlefield. The mature ATCCS will provide the tactical commander--

- A tool for managing large amounts of data
- The ability to track both friendly and enemy status on a near-real-time basis
- The ability to prepare, coordinate, and disseminate plans, orders, graphics, and reports much faster than ever before
- A shorter planning cycle that allows all echelons additional time to plan, prepare, and execute combat operations.

2.2.4 Reliance on Space Systems

Global connectivity requires seamless communications and an automation architecture that relies on the use of both space-based and terrestrially based systems. The characteristics of force projection that space systems facilitate include--

- Assessing enemy strength, location, and movement over wide areas
- Commanding and controlling forces over long distances (important for a CONUS-based, Force Projection Army, and for split-based logistics and intelligence operations)
- Positioning forces accurately
- Acquiring targets and attacking with precision weapons
- Forecasting weather quickly and accurately
- Developing detailed maps from imagery.

Acquisition of these capabilities translates into an unprecedented national capability the Army can use most beneficially on the battlefield. To obtain the requisite edge in space-based systems, we must take advantage of commercially available products and steer industry towards technologies that have military application.

Just Cause, Desert Shield, and Desert Storm readily showed that space systems offer tremendous advantages for both theater and tactical warfighters. It is imperative that we build upon the lessons learned from these operations to ensure the Army's force projection capabilities.

The recently completed post-Cold War C2 Review, and the Military Intelligence (MI) Relook, which reassessed the military intelligence functional area, highlighted Army dependence on space systems and identified key capabilities that a smaller Force Projection Army must have--distributing imagery, establishing corps and division commander's warfighters nets, taking advantage of space-based C2 broadcast capabilities, cueing/early launch warning for ballistic missile attacks, and providing ground positioning and location. These reviews also raised concerns about access to space systems for both collective training and warfighting.

2.2.5 Digitization of the Battlefield

The post-Cold War battlefield and battlefields of the immediate future will, by necessity because of the equipment available, use a mix of analog and digital data systems. The preponderance of new systems becoming available for use on the battlefield will employ digital data. The dilemma for developers and users is in determining the format in which two or more users will represent, communicate, and interpret the data. Developers and users must ensure that common standards and protocols are

available and in place to allow them to exchange all digitized data.

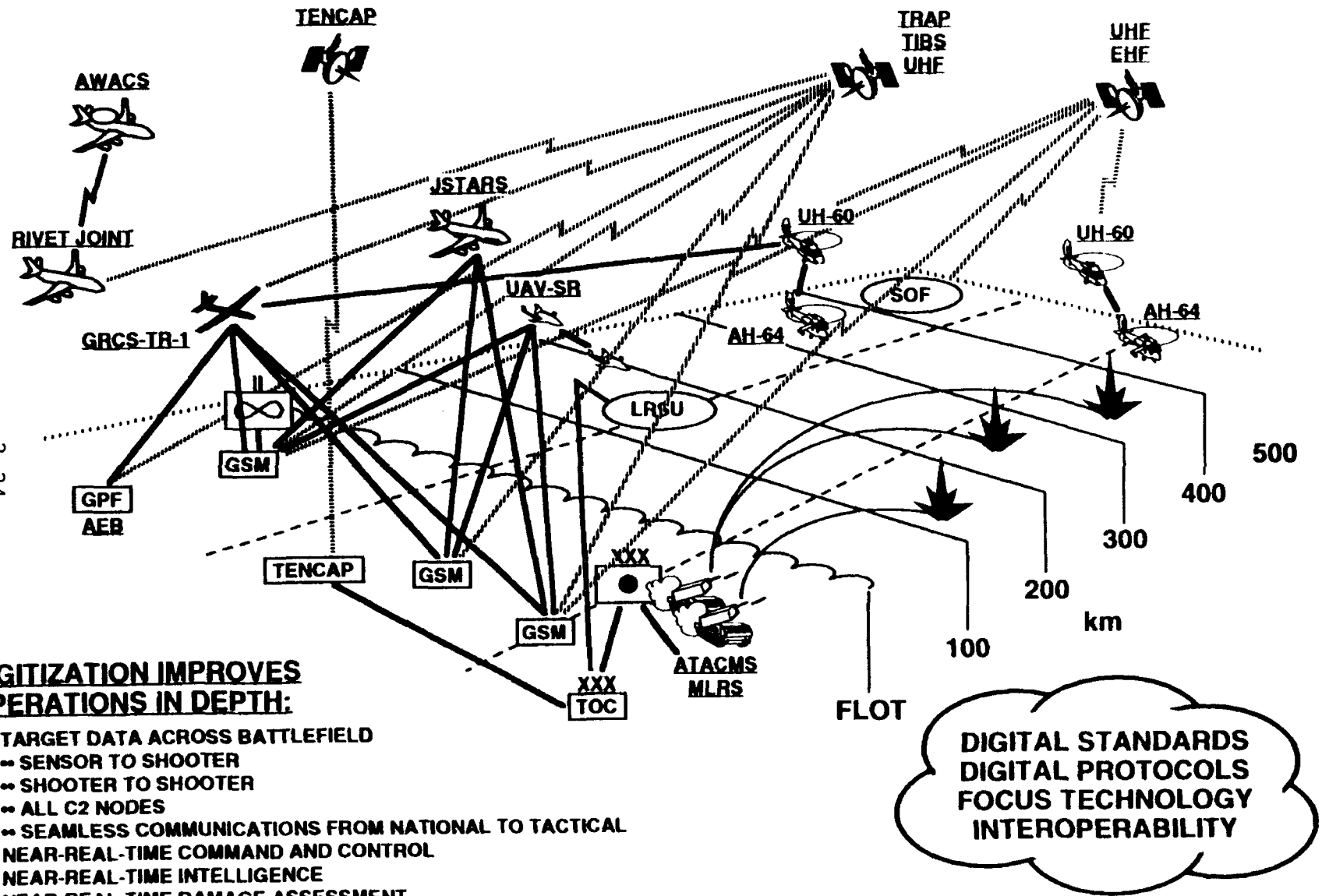
Digitization gives the warfighter an integrated data information network, using common standards and protocols, that supports warfighting systems, provides commonality, and assures C2 decision-cycle superiority. It offers three key battlefield enhancements:

- Supports improved targeting, which is more accurate and timely, permits commitment of additional systems to the fight, and synchronizes the affect

- Improves situational awareness and the common picture of the battlefield by supporting self-location, location of other "friendlies," and location of the enemy, all relative to graphic control measures

- Improves operations tempo (OPTEMPO) by increasing the rapid exchange of orders and graphics and establishing an electronic dialogue concerning enemy and friendly situations.

The first warfighting advantage accrued by digitizing the battlefield is to improve joint operations in depth by increasing the OPTEMPO of the battle and ensuring that all warfighters have a common picture of the battlefield (Figure 2-7). Warfighters must be able to integrate near-real-time command and control with near-real-time intelligence. They must synchronize operations in depth coupled with increased weapons lethality, and sustain operations at each echelon while forces are dispersed over extended battlespace distances.



DIGITIZATION IMPROVES OPERATIONS IN DEPTH:

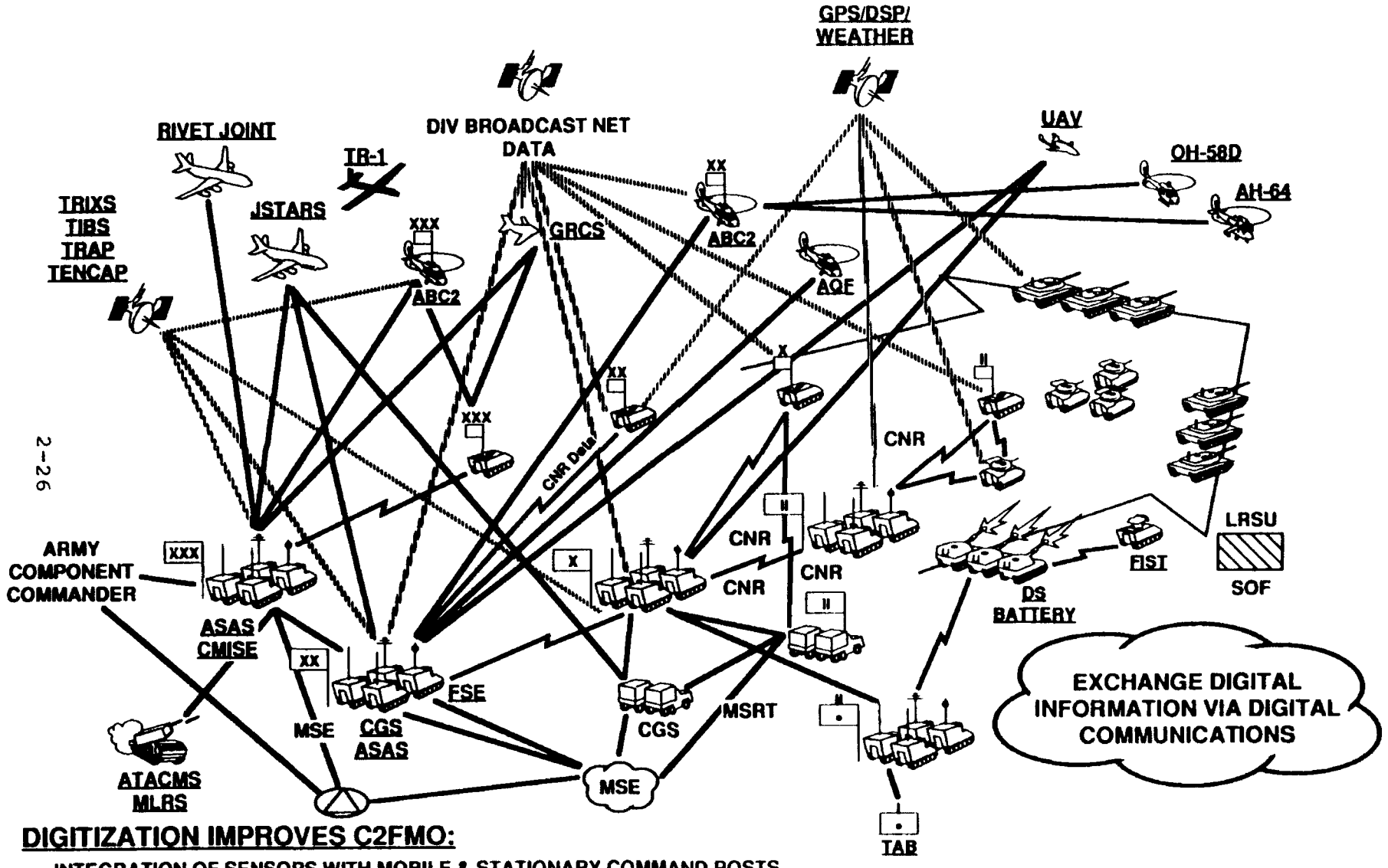
- TARGET DATA ACROSS BATTLEFIELD
  - SENSOR TO SHOOTER
  - SHOOTER TO SHOOTER
  - ALL C2 NODES
  - SEAMLESS COMMUNICATIONS FROM NATIONAL TO TACTICAL
- NEAR-REAL-TIME COMMAND AND CONTROL
- NEAR-REAL-TIME INTELLIGENCE
- NEAR-REAL-TIME DAMAGE ASSESSMENT

Figure 2-7. Operations In Depth

The second warfighting advantage accrued from digitizing the battlefield is to provide the warfighting capability that corps, division, brigade, battalion, and company commanders and staffs need for C2FMO (Figure 2-8). The commander, whether stationary, mobile, or airborne receives information in the right format anywhere on the battlefield. A seamless system architecture that does not discriminate among available communications systems transmits this information.

The third warfighting advantage accrued by digitizing the battlefield is the digital linking of the appropriate major combat systems in the combined arms team, which will furnish decisive advantages in the tactical fight (Figure 2-9). Each BOS maintains the information required for internal use and is able to exchange information with other BOSs in an interoperable format.

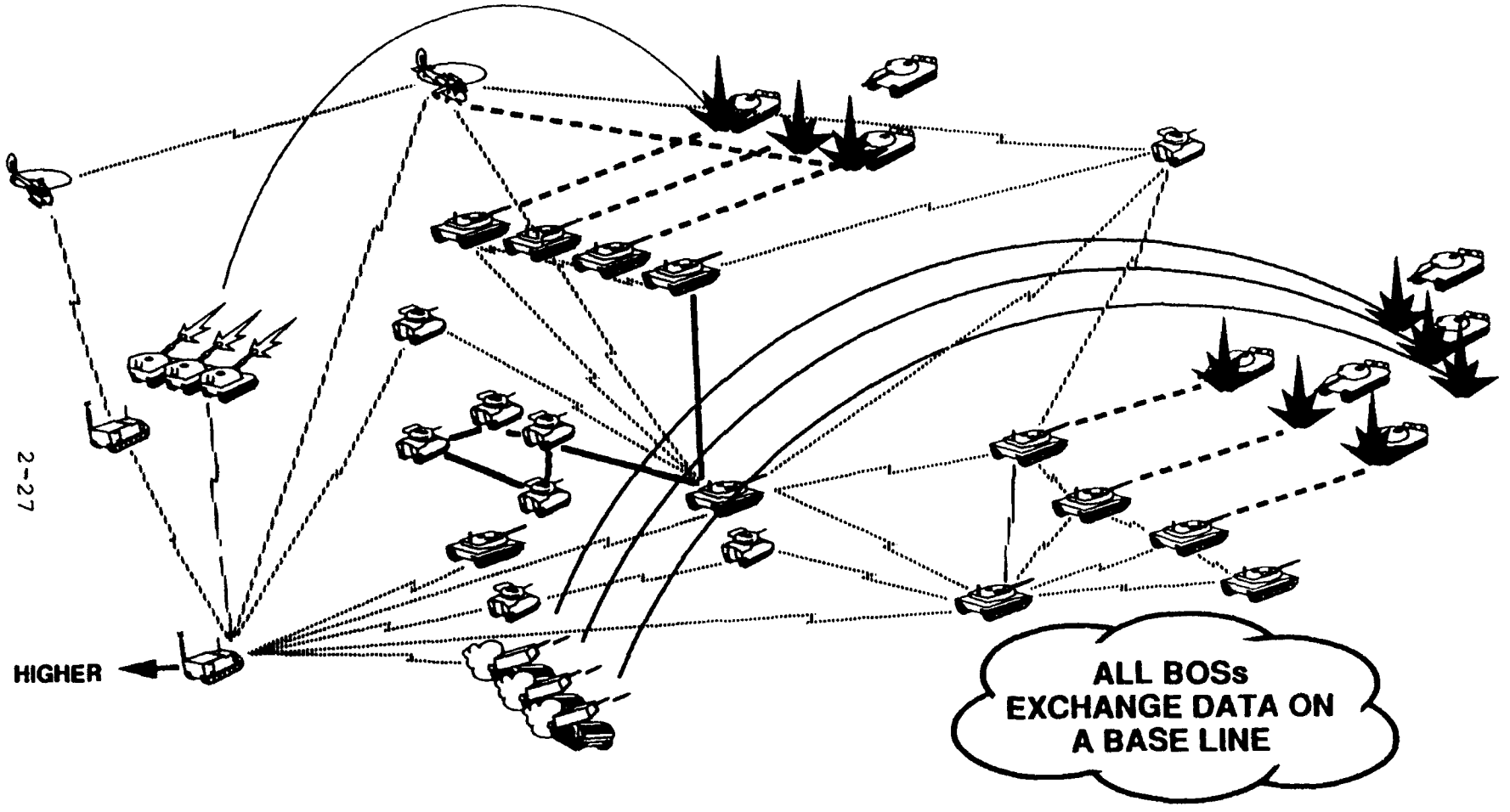
Digitization allows A2C2 users at all echelons access to a common picture of the battlefield showing both friendly and enemy locations as well as control measures.



DIGITIZATION IMPROVES C2FMO:

- INTEGRATION OF SENSORS WITH MOBILE & STATIONARY COMMAND POSTS
- DISTRIBUTION OF INFORMATION TO PRINCIPAL USER

Figure 2-8. Command and Control for Mobile Operations (C2FMO)



DIGITIZATION IMPROVES:

- **MANEUVER: Tactical Movement, Situation Awareness, Target Acquisition, Fire Distribution**
- **FIRE POWER: Target Development, Plans & Requests for Fires, Logistics**
- **FORCE PROTECTION: Weapons Control, Combat ID, Warning, Threat**
- **LEADERSHIP: Plans & Orders, Tactical Information, Situation Reports and Updates**

Figure 2-9. Tactical Fight .

SECTION III
THE ARMY AIRSPACE COMMAND AND CONTROL (A2C2) SYSTEM

SECTION III

THE ARMY AIRSPACE COMMAND AND CONTROL (A2C2) SYSTEM

3.1 INTRODUCTION

In general, the evolution of the FORCPAC2 concept as the Army's warfighting doctrine does not pose any revolutionary challenges for the A2C2 system. However, projected airspace requirements for support of FORCPAC2, combined with lessons learned from operations Desert Shield/Desert Storm, firmly establish a critical need to reevaluate A2C2 operations at all echelons of command, and consider their effect on the DTLOM domains. The A2C2 system must operate within the existing Army C4I system architecture currently being developed and fielded in conjunction with implementation of the FORCPAC2 concept.

The FORCPAC2 imperatives of strategic deployability, global connectivity, and battlefield agility characterize the offensive spirit of the Army's warfighting doctrine. Offensive operations, defined as placing the enemy in a position of disadvantage through the flexible application of combat power, requires a continuing emphasis on the principle of maneuver, which fights a four-dimensional battle in breadth, depth, height, and time.

Airspace is an important dimension of the commander's battlespace. The use of airspace to enhance maneuver requires coordination among all airspace users (Army, other services, and allied forces) to operate with as few constraints as possible. The A2C2 accomplishes the airspace management function in the Army's area of operations.

The Army's FM 100-103, *Army Airspace Command and Control in a Combat Zone*, embodied the doctrinal tenets for airspace

management prior to the occurrence of Desert Shield/Desert Storm and the FORCPAC2 concept development--and their influence on these tenets. The published version, therefore, provides the doctrine for a baseline A2C2 system--with its organization, staff functions, techniques, procedures, information, and interface requirements--and is consistent with joint doctrine. An understanding of the baseline system missions, functions, tasks, and operations, as well as consideration of lessons learned in Desert Shield/Desert Storm and influence of FORCPAC2, is essential to analyzing its deficiencies and shortcomings for the purpose of defining requirements and identifying issues for resolution. Based on current doctrine, Army airspace and control consists of these functions:

- Coordination
- Integration
- Regulation
- Identification.

Through coordination, the A2C2 system maximizes effectiveness by ensuring that simultaneous airspace use is synchronized in time, space, and purpose to produce maximum combat power at decisive moments. Integration ensures requirements for airspace use are coordinated at the lowest possible level, while regulation precludes real-time conflicts among the various airspace users without reducing their flexibility. Identification enhances timely engagement of enemy aircraft and missiles while reducing the potential for fratricide.

3.2 A2C2 MISSIONS AND FUNCTIONS

Ground commanders must have the freedom to use and protect the airspace over their forces. Additionally, they must have maximum flexibility to use organic and supporting assets within that airspace under any limitations that the joint force commander (JFC) may impose. Of paramount importance is a

responsive A2C2 system, capable of close and continuous coordination among all airspace users. The following paragraphs discuss Army operations that require airspace coordination and integration with other friendly combat forces.

3.2.1 Army Aviation Operations

Army aviation provides the ground commander with an unprecedented capability on the battlefield. Highly mobile and responsive, aviation is used in a wide variety of combat and combat support missions. These missions consist of:

- Combat
  - Attack
  - Reconnaissance and security
  - Assault
  - Air combat
  - Special operations.
- Combat Support
  - Command and control
  - Air movement
  - Special electronic missions
  - Aeromedical evacuation.

Aviation units are assigned to echelons above corps (EAC), corps, divisions, and armored cavalry regiments. The flight patterns that aviation units employ depend on the mission, threat, terrain, and relative location on the battlefield. In forward areas, where close and deep operations are conducted (forward of the division rear boundary), the threat normally governs airspace requirements. Aviation units maneuver over the battlefield, operating in the terrain flight environment. These units use such

techniques as assignment of objectives, sectors, zones, air axes or air corridors, phase lines, boundaries, and battle positions. They use assembly areas, forward arming and refueling points (FARPs), attack positions, graphic control measures, and other standard procedures such as standard-use Army aircraft flight routes (SAAFRs). Aviation units in this area require tactical flexibility and normally employ procedural control measures instead of positive control. In the rear operations area (division rear boundary to corps rear boundary), air traffic normally moves along axes perpendicular to the forward line of own troops (FLOT) between division support areas, major base locations, airfields, and C2 facilities. Because the threat is diminished, flight paths are predictable, following routes that are easy to navigate and avoiding restricted areas and other hazards. Aviation operations in the rear are more closely managed, using positive control and standing operating procedures (SOPs).

Army aviation assets are also used to transport supplies, personnel, and equipment throughout the combat zone. Operational support includes all missions except those involving the movement of combat forces to contact in the objective area (air assaults). Operational support forces normally operate in the corps and division rear areas. Airspace requirements necessitate coordination between the operational support managers and A2C2 personnel. Army employment of operational support missions forward of the brigade rear area boundary is a command decision based on available assets, mission priority, and factors of mission, enemy, terrain, troops, and time available (METT-T).

3.2.2 Fire Support Operations

Fire support is the collective and coordinated employment of the fires of armed aircraft, land- and sea-based indirect fire systems, and electronic warfare systems against ground targets to support land operations at both the operational and tactical

levels. Fire support integrates and synchronizes fires and effects to delay, disrupt, or destroy enemy forces, combat functions, and facilities in pursuit of operational and tactical objectives. Subordinate systems and processes for determining priorities, identifying and locating targets, allocating fires assets, attacking targets, and assessing battle damage must be fully integrated.

Field artillery is the principal means of fire support in fires and maneuver. It provides fires with cannon, rocket, and missile systems, and integrates all fire support systems available to the commander. Artillery can neutralize, suppress, or destroy enemy direct fire forces; attack enemy artillery and mortars; deliver scatterable mines to isolate and interdict enemy forces or protect friendly operations; contribute to the attack throughout the depth of the enemy's formations; and suppress enemy air defense systems to facilitate ground and air operations. Field artillery provides continuous fires in support of the commander's schemes of maneuver including its ability to mass fires. Field artillery weapons can mass fires against a specified target by all the weapons within range.

Field artillery provides day, night, and all-weather fire support to maneuver forces--and, in many cases, provides the only additional fires available to maneuver units beyond their own direct fire capability. A2C2 and fire support planners must ensure that the maneuver forces are not denied these fires, or other fire support through lack of coordination and synchronization that may jeopardize mission accomplishment and increase friendly casualties.

The highest probability of conflict between field artillery fires and other airspace users occur at relatively low altitude, in the immediate vicinity of the firing units and target locations. Close interfaces between fire support elements (FSE) and A2C2 elements ensures the exchange of information, the routine

coordination of planned artillery fires with air operations, and the coordination of planned air activities with ground operations.

3.2.3 Air Defense Artillery (ADA) Operations

The mission of ADA is to protect the force and selected geopolitical assets from aerial attack, missile attack, and surveillance. ADA activity must be integrated into A2C2 to properly coordinate and control the use of friendly air defense weapons systems at each echelon. Forward Area Air Defense Command, Control, and Intelligence (FAADC2I) automates engagement operations and force operations to provide accurate and timely information (air defense warning, weapons control orders, real-time air threats, alerting, cueing, and air battle operations) to the supported force at the division and maneuver brigade providing protection and situational awareness. FAADC2I and its subsystems which consist of hardware, software, communications equipment, will integrate into and interoperate with ATCCS. The FAADC2I system will provide air picture and command and control information throughout the forward area air defense (FAAD) and the combined arms force it supports.

ADA personnel in the divisional A2C2 element use the FAAD Airspace Command and Control subsystem. The ADA A2C2 liaison officer (LNO) monitors the division air picture and recommends to the division commander the level of air defense warning. This subsystem is also used to prepare and disseminate the rules of engagement (weapons control orders) as defined by the area air defense commander (AADC). The ADA A2C2 LNO also acts as the air track identification authority for the FAADC2I system. He prepares and disseminates airspace user restrictions in the form of various airspace control measures, such as low-level transit routes (LLTR), transit corridors (TC), weapons free zones (WFZ), high-density airspace control zones (HDACZ), restricted operations zones (ROZ),

air routes (AR), coordination levels (CL), and traverse levels (TL).

FAADC2I is being developed and fielded in three block architectures: light division, heavy division, and the objective system. The light division uses the light and special division interim sensor (LSDIS) and SINCGARS radios for one-way data distribution. The local air picture is correlated with information from the airborne warning and control system (AWACS) and distributed to the weapon systems and A2C2 elements. The heavy division and objective systems will utilize the ground based sensor (GBS) and ADDS radios for duplex data communications and sensor netting.

3.2.4 Special Electronic Mission Aircraft (SEMA) Operations

The corps military intelligence (MI) brigade collects intelligence information on enemy deep targets using SEMA. The SEMA assets are assigned to the aerial exploitation battalion (AEB). These aircraft include the Guardrail, Quick Look, and side-looking airborne radar (SLAR) aircraft. The AEB SEMA usually conduct flight operations in airspace within the corps area of operations, well behind the forward line of own troops (FLOT) and above the coordination altitude. Flight profiles are situationally dependent and are based on mission requirement, aircraft/sensor capabilities, weather, and the threat.

3.2.5 Heliborne Electronic Warfare Operations

Quick Fix helicopter assets assigned to the aviation brigade conduct intercept and electronic countermeasures operations. The flight profile is METT-T dependent; however, many times it will be required to operate above the coordinating altitude, on short notice.

3.2.6 Unmanned Aerial Vehicle (UAV) Operations

UAVs conduct targeting, situation development, battle damage assessment, and battle management operations. This asset is organic to corps and EAC MI brigades, division MI battalions, and MI companies in armored cavalry regiments. UAVs operate out of corps, division, and brigade areas and fly beyond the FLOT with up to ten hours mission duration. Airspace conflict is likely in the vicinity of the launch and recovery sites as well as while crossing the FLOT.

3.3 ARMY AIRSPACE COMMAND AND CONTROL (A2C2) SYSTEM

The A2C2 system includes the organizations, facilities, personnel, responsibilities, and procedures required to perform the airspace control functions.

3.3.1 A2C2 Organizations, Facilities, and Personnel

The A2C2 functional organization (Figure 3-1) is an arrangement of staff elements at each echelon from battalion through the theater army--or the land component commander, if the senior Army maneuver commander is so designated. Depending on the echelon, it includes air defense artillery C2 elements, fire support coordination elements, Army air traffic services facilities, and airspace control liaison personnel in key facilities supporting Army operations. The A2C2 element is located within the CP established by each tactical echelon. The functions of these CPs vary; however, each CP usually accomplishes generic functions. Only CPs at division and above have formal A2C2 elements to accomplish A2C2 tasks.

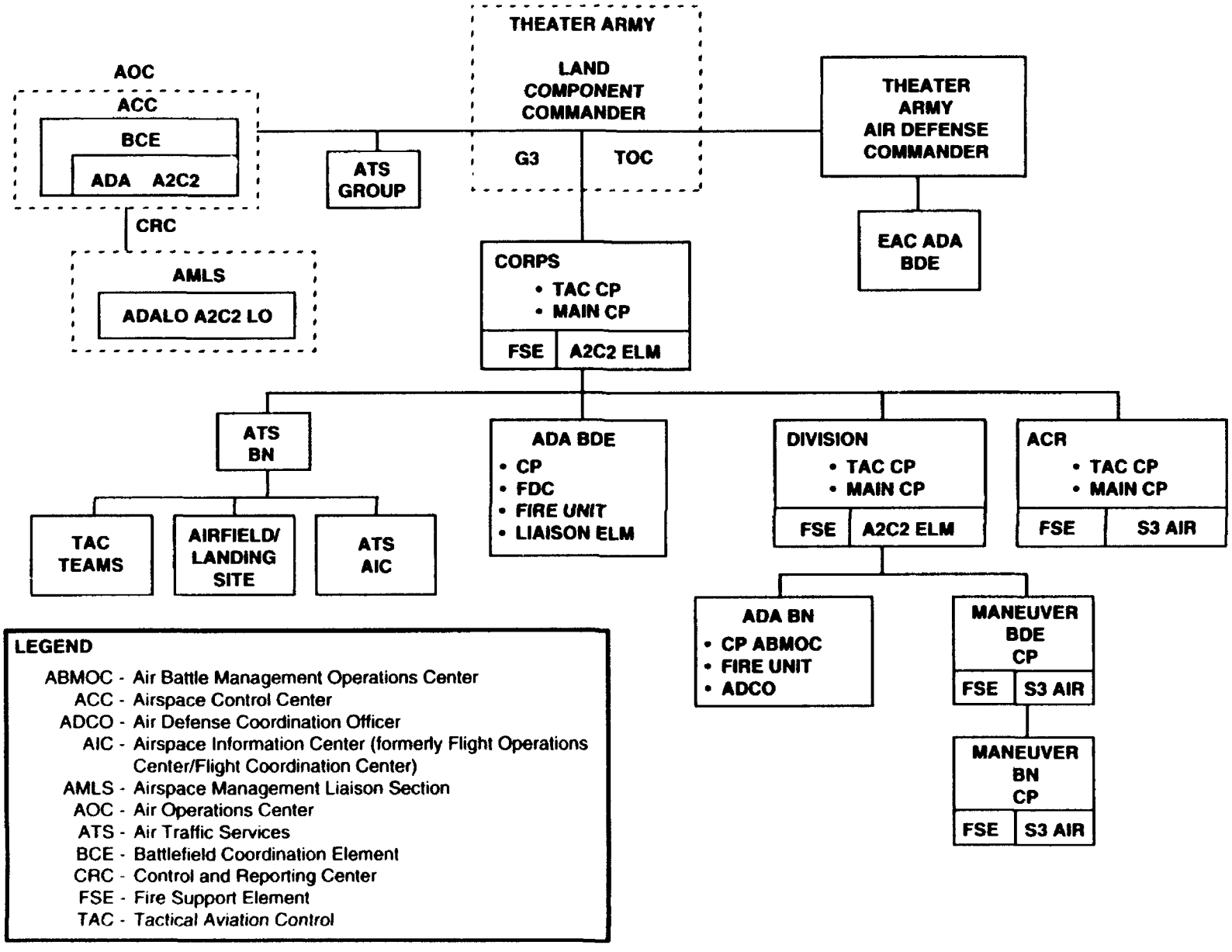


Figure 3-1. The A2C2 Functional Organization

3.3.1.1 Echelons Above Corps (EAC)

A2C2 elements at this level provide the interface required for multi-Service or joint operations. The A2C2 elements are located both at theater army headquarters (G3 Air) and at the air operations center (AOC). The majority of coordination takes place between the battlefield coordination element (BCE) and the AOC or the theater equivalent for the Navy and Marine Corps (tactical air command center [TACC]). The Army provides the BCE, which integrates ground force requirements. It provides prioritized land-force air support requirements for inclusion into the theater air operations plan. It monitors and interprets the land battle for the AOC/TACC and is the coordination conduit between the Army and other services for air-ground operations. The BCE is collocated with the senior control element for the joint force air component commander (JFACC) and expedites the exchange of information through face-to-face contact.

The BCE has six functional elements: fusion, operations, plans, intelligence, air defense and A2C2, and airlift. Ground liaison and air reconnaissance liaison officers, under the BCE's direction, accomplish coordination with supporting air wings. The air defense and A2C2 element coordinates Army air defense and airspace activities with the plans and operations sections within the AOC/TACC. It exchanges information with the air defense artillery liaison officer (ADALO) at the CRC/TAOC, land component headquarters (within the A2C2 cell), and ADA CP. Specific A2C2 duties include:

- Coordinating Army airspace requirements with the airspace control authority (ACA)
- Coordinating other service's airspace use requirements with the Army
- Integrating Army airspace user activities

- Advising AOC/TACC on Army operations that affect joint use of airspace
- Representing ground force interests in the development of airspace control measures
- Receiving, for staffing and approval, Army requests for airspace control measures.

3.3.1.2 Corps Level

The corps A2C2 organization is based on requirements to support future operational planning, conduct current operations, and perform the specified functions of each CP.

Normally, the A2C2 element at the corps main CP is collocated with the FSE and is the focal point for all airspace control activities related to corps rear area operations, deep operations, and for the planning of future operations. The A2C2 element works for the G3; normally the G3 Air supervises its activities. The A2C2 element in the main CP consists of, but is not limited to representatives from the ADA element, aviation element, air liaison officer (ALO), fire support element (FSE), the air traffic services (ATS) battalion assigned to the corps, the G2 collection, management, and dissemination (CM&D) section (as required), the G4 section (as required), and the air/naval gunfire liaison company (ANGLICO). Personnel assigned A2C2 staff responsibilities from these elements and sections accomplish two distinct, but related, tasks. They perform their primary staff functions and they assist in the A2C2 process by synchronizing the airspace requirements of their parent units with the airspace users of the combined arms team and supporting services.

Airspace control activities that support the execution of close operations are primarily accomplished at the tactical (TAC) CP with the A2C2 element in the main CP providing support. The TAC and the main CP maintain close coordination to ensure that airspace

requirement changes, dictated by the tactical situation, are met in a timely, effective manner. The corps A2C2 element representatives at the TAC should consist of, as a minimum, a fire support officer (FSO), an aviation officer or noncommissioned officer (NCO), an ADA officer or NCO, and an ALO or his representative. Either the FSO or aviation officer serves as the element chief.

3.3.1.3 Division Level

The organization of A2C2 elements within the division TAC and main CPs are similar to that at corps. However, the division's primary focus is on the conduct of battles and engagements in the forward portion of the combat zone (division rear boundary and forward). Therefore, airspace control tasks are primarily those required to synchronize all airspace users of the combined arms team and supporting services during the close battle. The difference in geographical orientation (forward vs. rear) results in minor differences in the airspace control procedures employed and the degree of coordination required. There is no formal A2C2 element established at the TAC CP.

Designated representatives from selected staff and liaison elements accomplish the A2C2 functions at the division TAC CP. At a minimum, these personnel include a G3 officer, as chief, assisted by an FSO, an aviation representative, an ADA representative, and a fighter liaison officer (FLO).

The A2C2 element at the division main CP includes representatives from the G3 Air, ADA element, aviation element, ATS liaison element (as required), FSE, G2 CM&D section (as required), G4 section (as required), ALO, and ANGLICO.

3.3.1.4 Brigade, Armored Cavalry Regiment (ACR), and Battalion Levels

No special staff element exists at brigade, ACR, and battalion levels to perform the A2C2 functions. Consequently, existing staff personnel, supporting liaison representatives, and fire support representatives perform the A2C2 functions. Existing staff elements that perform the A2C2 functions include the S2, S3 Air, fire support section, LNOs from aviation and ADA, and the ALO.

3.3.2 A2C2 Responsibilities

A2C2 elements form vertical and horizontal channels through which airspace control requirements, plans, orders, and information are coordinated, disseminated, and synchronized with the tactical operations plans. Primary tasks of the A2C2 elements include:

- Developing and coordinating airspace control SOPs, plans, and annexes
- Coordinating and integrating Army airspace user requirements within the area of operations
- Coordinating and integrating Army airspace use within the area of operations with other services and adjacent units
- Identifying and resolving airspace user conflicts
- Approving, staffing, and forwarding to the next higher headquarters all requests for special use airspace
- Maintaining A2C2 information displays and maps.

3.3.3 A2C2 Procedures

Success on the battlefield depends on how effectively airspace over that battlefield is used. A high density of friendly

weapon systems with overlapping flight profiles and operating envelopes must contribute to maximum combat effectiveness without user conflicts. Airspace control maximizes force effectiveness without inhibiting either the ground effort or the airspace users supporting it. Procedures define the methods of accomplishing the airspace control function, ensuring unity, and standardizing the airspace control effort. Those procedures must be sufficiently flexible and responsive to accommodate rapid changes to planned and ongoing operations.

3.3.3.1 Planning Considerations

The tenets of force projection dictate that Army staff planners follow certain considerations in developing their portion of the airspace control plan. These include:

- Maximize use of procedural means of control, using a variety of airspace control measures to manage by exception. When established, these airspace control measures reserve airspace for specific airspace users, restrict actions of airspace users, control actions of specific airspace users, and/or require airspace users to accomplish specific actions
- Employ positive control only where such control is required and possible. In airspace control, for a commander to exercise positive control, means must exist to identify and locate airspace users and to maintain continuous communications with airspace users
- Ensure the scheme of maneuver and the commander's intent determine and govern the design of the plan
- Use airspace with maximum freedom allowed under theater directives such as the theater airspace control order.

- Structure airspace control measures to facilitate recognition by airspace users and ground-based weapons crews
- Ensure temporary airspace control measures are within the boundaries of the command echelon requesting the measure.

3.3.3.2 Implementation

Establishing most airspace control measures requires the approval of the airspace control authority (ACA). Standard-use Army aircraft flight routes (SAAFRs) do not require ACA approval. Army commanders inform the ACA of their requirements for these measures through the operational chain, as depicted in Figure 3-2. When multiple land formations are required, the joint force headquarters may assign an intermediate control headquarters, such as a land component or army group, for command and control. The use of the US Message Text Format (USMTF) facilitates and standardizes the process of requesting the establishment of the airspace control measures. Airspace request formats, using USMTFs, outline the necessary information, including location, lateral and vertical limits, and the time frame during which the measure is enforced. The A2C2 element at each echelon reviews requests to ensure the information is complete and the measures requested support the concept of operations. Each A2C2 element also determines whether the measure affects other airspace users in the area. Once the ACA has approved an airspace control measure, he disseminates it to all appropriate elements, using the standard USMTF.

3.3.3.3 Execution

Army commanders, staffs, and airspace users employ an array of SOPs to assign responsibility, ensure conformity; describe and illustrate the concept; maintain separation of the force;

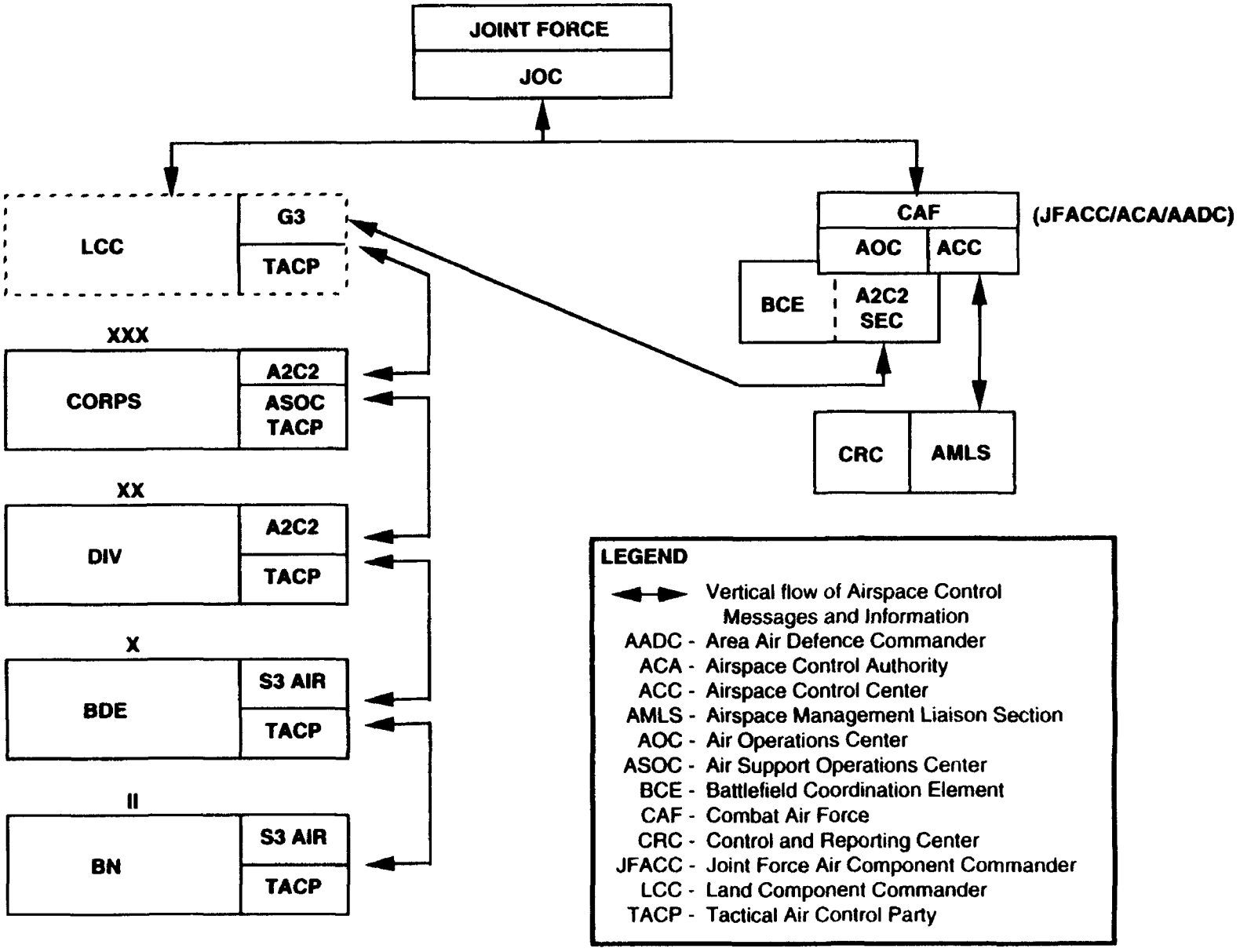


Figure 3-2. Airspace Control Measures Approval

concentrate effort; coordinate fires with maneuver; and assist in C2 of the forces. When A2C2 elements combine SOPs with airspace control measures, they have the means to graphically depict and control maneuver of Army airspace users in the area of operations. The Army relies on procedural control measures, such as coordinating altitudes and SAAFR, as the means of synchronizing airspace use in the operations area. Airspace control measures, SOPs, and graphics, fire support coordination measures (permissive and restrictive), and air defense rules of engagement and control measures (hostile criteria, weapons control status, and weapons engagement areas) are included in the Army methodology used for airspace control. Except for the coordinating altitude, and use of SAAFRs in the corps and division rear, other joint airspace procedural control measures are used only as required to supplement Army control measures and to facilitate the employment of other services in the airspace over the battlefield.

3.3.3.4 Airspace Deconfliction Procedures

Early in the planning phase, the A2C2 staff reviews supporting plans, overlays, graphics, and sketches that depict and illustrate maneuver, fires, air defense, reconnaissance and surveillance, electronic warfare, and sustainment operations. The staff identifies potential airspace conflicts and follows established procedures to resolve the conflict or reduce the risk. It further evaluates the potential conflict by looking at the altitude and time. If the airspace users involved have sufficient altitude and/or time separation, then no conflict exists. If a conflict does exist, the A2C2 element selects one or more of the following options:

- Establish procedural control employing SOPs
- Change the time sequence, or relocate either the airspace user or another element
- Establish an airspace procedural control measure

- Eliminate an airspace user, or restrict the operation of an airspace user
- Make the decision to accept the risk.

3.3.3.5 Conflict Resolution

Conflicts that cannot be resolved at a particular A2C2 echelon are forwarded through operational channels to the A2C2 element at the next higher echelon. Normally, the A2C2 element at division or corps level resolves conflicts involving only Army forces. Conflicts involving other service forces must be resolved at a higher level. A2C2 actions taken during planning are one aspect of the process. Reacting to changes in the tactical situation during the conduct of the battle requires similar actions; however, the obvious difference is the amount of time available to resolve, coordinate, and disseminate the revised information.

3.4 A2C2 *COMMUNICATIONS/INFORMATION FLOW*

The A2C2 system does not have a dedicated communications net. The A2C2 system relies on the existing communications systems of each functional airspace user - maneuver, air defense, fire support, intelligence/electronic warfare, and combat service support. A2C2 elements communicate horizontally and vertically using G3 and/or S3 staff section communications links and automated systems. Means include secure/nonsecure voice, using single channel and/or multichannel radios (VHF-FM, VHF-AM, HF and UHF), wire, and/or satellite, with a record copy by messenger. Figure 3-3 depicts the communications connectivity established in the Army C2 system that the A2C2 system utilizes to conduct its functions. Although multichannel radios provide the primary means for the A2C2 elements to maintain contact with their parent organizations, alternate means may include FM communications that the parent unit provides. Communications between the A2C2 system and airspace

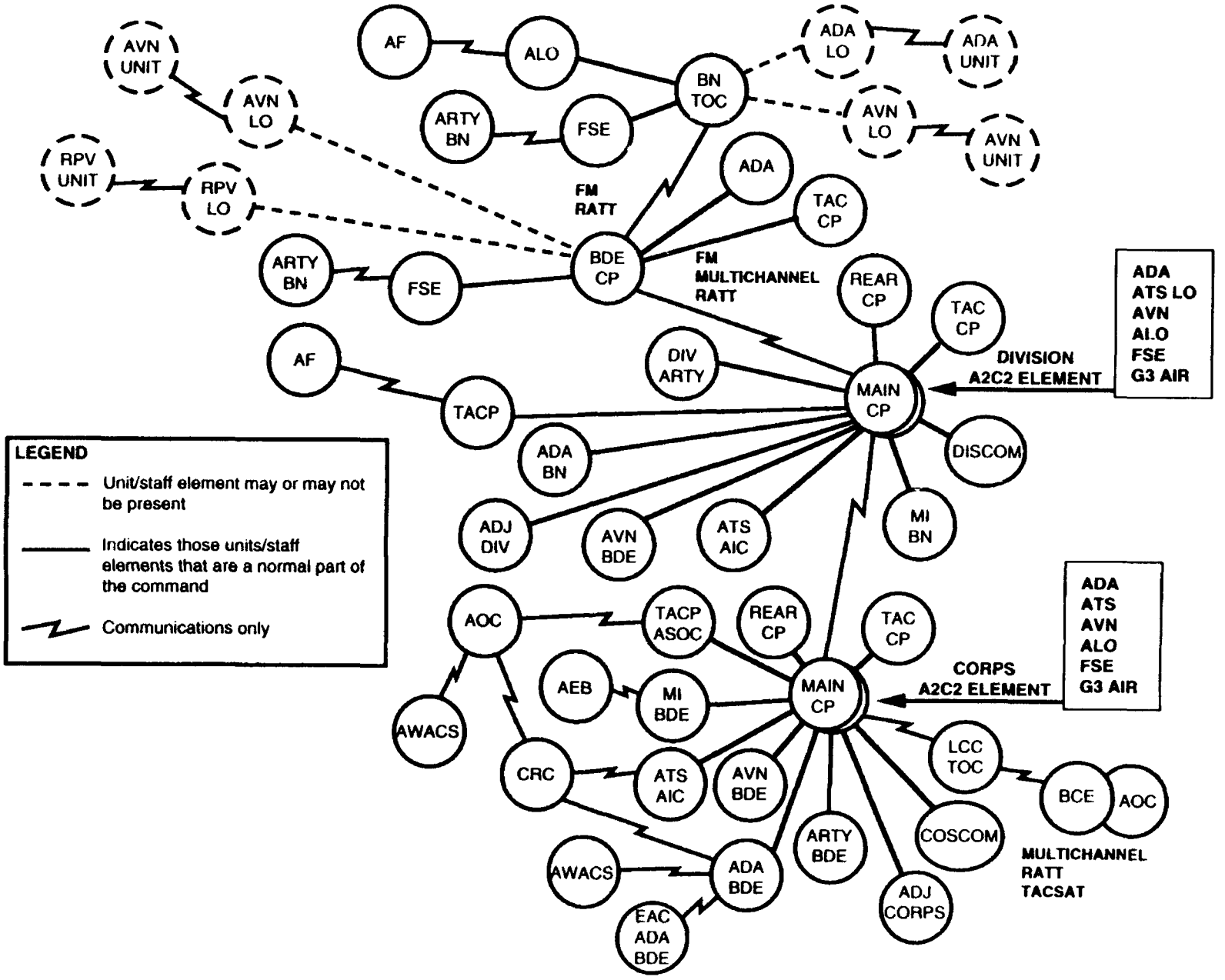


Figure 3-3. Army Communication Connectivity

users is primarily through the Army ATS elements employed in support of the A2C2 system.

The Army is improving its information exchange capability on the battlefield with the introduction of several advanced communications and automation systems.

- SINCGARS provides more channels, increased equipment reliability, expanded data exchange capability, and jam resistance. This will enhance the planning and coordination of airspace activities.
- MSE integrates wire and radio systems, automatically locates local subscribers, and enhances information exchange between the echelons of command on the battlefield. This system's equipment also will provide the A2C2 elements with a better capability to plan, coordinate, and execute airspace management.
- MCS, when fully operational, will significantly enhance the exchange and processing of data among all Army C2 elements, including the A2C2 system. This hardware/software interface will be capable of integrating with all existing and proposed combat net radio, area communication, and data distribution systems to distribute data efficiently in near-real-time throughout the system. The MCS assists the A2C2 element by linking all maneuver element CPs and by integrating air defense, intelligence/EW, fire support, and CSS functional areas. Decision graphics built into the software will provide automated means of planning, coordinating, and executing airspace coordination and integration.

3.5 INTEGRATED COMBAT AIRSPACE COMMAND AND CONTROL (ICAC2)

3.5.1 Introduction

The modern battlefield, including the airspace above it, is becoming increasingly saturated. Effectively coordinating, integrating, and deconflicting the airspace that friendly forces use will be a challenge in future operations. Executing the airspace control function requires a joint effort, using service airspace command and control systems as a framework for integration. Integrated Combat Airspace Command and Control (ICAC2) describes the airspace control architecture at the functional/service component command level and above that melds unique service capabilities into a system for joint/combined operations. ICAC2 doctrine is being written and will become part of various service publications (e.g., Army FM 100-3-1). This tactics, techniques, and procedures (TTP) manual provides the methodology for planning, implementing, and executing that integrated airspace control function in combat.

3.5.2 ICAC2 Organization

The joint force commander (JFC) establishes command relationships and assigns authority to subordinates based on the operational situation, component capabilities, and mission complexity. Although the structure will vary with the situation, developers of the airspace control system within the structure normally use the following organizational elements, personnel, and protocol. A notional organizational structure is shown at Figure 3-4. Where circumstances dictate, the JFC will prescribe the appropriate modification.

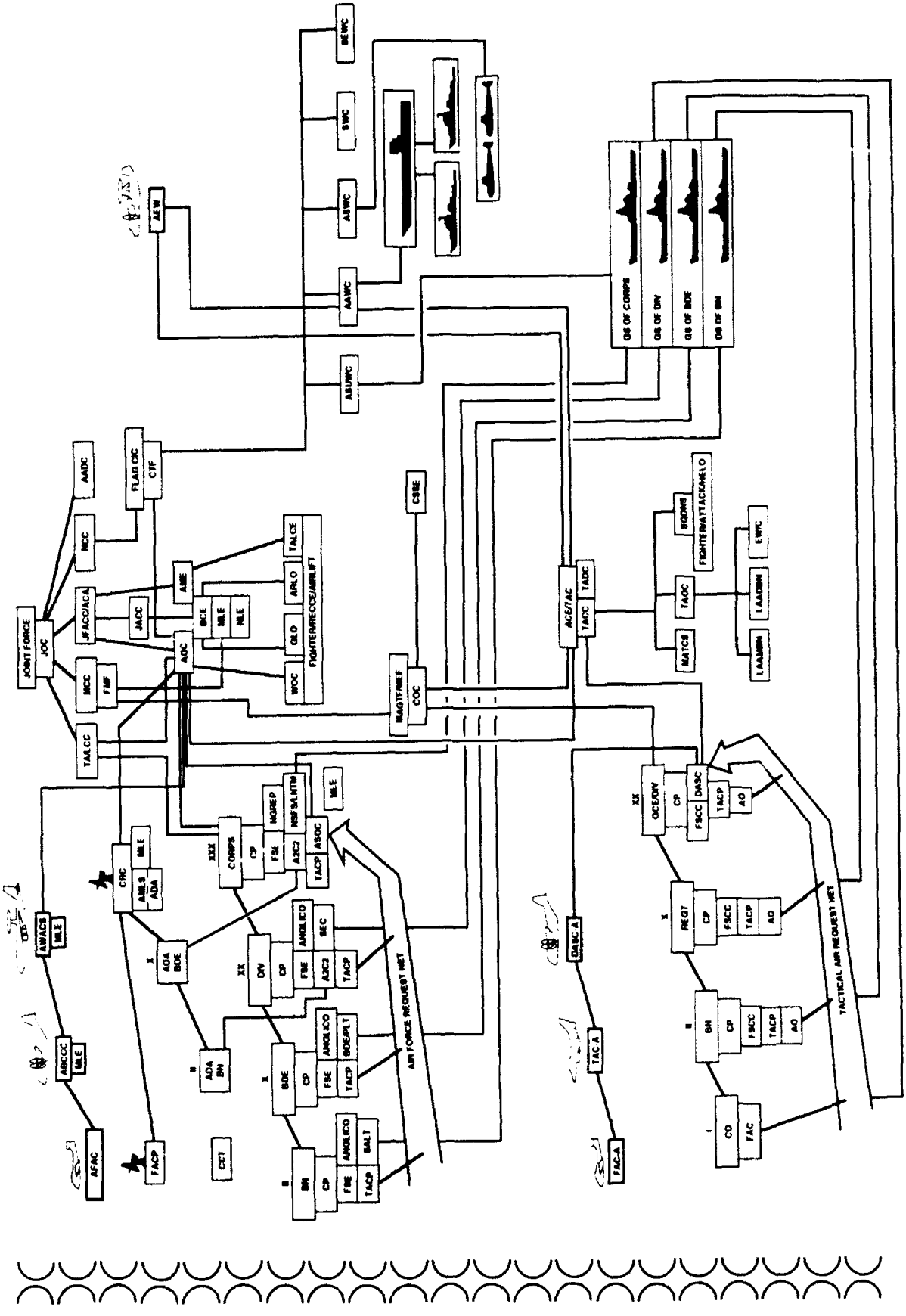


Figure 3-4. Joint Force Airspace C2

3.5.2.1 Airspace Control Authority (ACA)

The JFC will normally designate an ACA. The broad responsibilities of the ACA include coordinating, integrating, and regulating the use of the airspace control area. Subject to the authority and approval of the JFC, the ACA develops procedures for airspace control and for the coordination required among units within the area of operations. The ACA establishes an airspace control system that is responsive to the needs of the JFC, provides for integration of the airspace control system with that of the host nation, and coordinates and deconflicts user requirements. The ACA develops the airspace control plan (ACP) and, after JFC approval, promulgates it throughout the area of operations. Implementation of the ACP is through the airspace control order (ACO).

3.5.2.2 Area Air Defense Commander (AADC)

The JFC normally also designates an AADC. The successful conduct of air defense operations requires the integrated operations of all available air defense systems. Air defense operations also must be coordinated with other operations, both on and over land and sea. Thus, the responsibilities of the AADC are interrelated with those of the ACA. The JFC, therefore, usually designates one person to perform both the AADC and ACA function. If, however, this is not the case, close coordination between the AADC and ACA is absolutely essential.

3.5.2.3 Joint Force Air Component Commander (JFACC)

The JFC will normally designate a JFACC and defines the JFACC's responsibilities. Usually, these include--but are not limited to--planning, coordinating, allocating, and tasking of air sorties based on the JFC's apportionment decision. The JFC, based

on the combat situation, may also delegate ACA and/or AADC authority to the JFACC.

3.5.2.4 Joint Airspace Control Center (JACC)

The JACC provides the ACA with the capability to centrally plan, coordinate, integrate, and regulate the airspace control function. Since the ACA is normally a component commander, the JACC is usually collocated with that component's senior command and control element. It is imperative that the JACC have appropriate representation, with proper tactical expertise, from all the services involved and from the host nation(s). Ideally, the JACC would be formed during a military operation as a permanent organization, jointly manned and operated, that would not require augmentation.

3.5.2.5 Functional or Service Component Commands

The mission to be accomplished, the objective to be attained, and the capabilities of the component elements are the three most fundamental considerations in establishing the command organization. The JFC will establish his organization on either a functional or a service basis. Regardless of the option he chooses, integrity of the airspace control systems at the component level (functional or service) and below, must be maintained.

3.5.2.6 Liaison Interfaces

Appropriate component commander representatives need to be properly located throughout the ICAC2 system. These representatives serve their parent command as well as the unit to which they have been assigned. Most importantly, however, they ultimately serve the JFC who has responsibility for the success or failure of all operations in the combat zone. Early in the implementation phase, the ACA determines the number of liaison

officers required, their experience levels, and their location, as the ACA element organizes to support the airspace control function.

3.5.3 ICAC2 Procedures

3.5.3.1 ICAC2 Planning

3.5.3.1.1 Time Constraints. The joint force's success in meeting all of its objectives and completing the assigned mission is directly proportional to the level of preparation. While every contingency cannot be anticipated, early preparation can make the difference between success and failure.

3.5.3.1.2 Preliminary Preparation. The JFC, having operational control of all assigned forces, is authorized to perform the functions of command over subordinate forces, including organizing and employing those commands and forces, assigning tasks, designating objectives, and giving the authoritative direction necessary to accomplish the mission. Formulation of airspace control policy is an essential part of this process. Although not formal in nature, airspace policy takes form when the JFC and his staff accomplish the following:

- Prioritize missions, outline restrictions, and develop risk acceptability parameters
- Define the airspace control area
- Designate the airspace control authority (ACA)
- Define organization, authority delegated, and relationship among subordinate commanders
- Document the means for adjudication.

3.5.3.1.3 Situation Assessment. Based on both explicit and implicit airspace control guidance that the JFC provides, the ACA and his staff, with the support of the component commanders and

their subject-matter experts, assess other factors that affect the airspace control architecture. These include:

- Enemy air/missile threat
- Friendly air/missile posture
- Friendly airspace control capabilities
- Interface requirements with host nation and combined forces and any unique missions.

3.5.3.2 ICAC2 Implementation

Following the situation assessment, the ACA in coordination with the component commanders builds the organization and develops the process for coordinating, integrating, and regulating the airspace control function.

3.5.3.2.1 ACA Organization. The ACA organizes a JACC to plan, coordinate, integrate, and regulate the airspace control function. This organization, collocated with the ACA's senior C2 element (Air Force AOC, Navy TACC, or Marine Corps TACC), should possess sufficient joint personnel structure to man the battle staff for the operation. If such a staff does not exist or cannot be established, a strong liaison network is required. The ACA must define and incorporate specific requirements in the ACP for JFC approval.

3.5.3.2.2 Airspace Control Process. Once organized to facilitate integration of the combat airspace command and control systems in the theater of operations, the ACA's next step is to define the airspace control process it will use, and the means to institute procedural control measures, when required. The process establishes--

- Breadth of control
- Degree of control

- Processing procedures for airspace control requests
- Conflict resolution.

3.5.3.2.3 Airspace Control Plan (ACP). The ACP is the centerpiece of the ICAC2 system. Generated by the ACA in coordination with the functional/service component commanders and approved by the JFC, the ACP provides specific planning guidance and procedures for the airspace control system. The ACA disseminates the ACP to appropriate agencies, including the component commanders. Normally, the ACP is included as an annex to the joint force operations plan (OPLAN) or operations order (OPORD); however, depending on time constraints, the ACA may distribute the ACP separately.

3.5.3.3 ICAC2 Execution

While the ACP provides general guidance on the airspace control function, the ACO institutes airspace control procedures for specified periods of time.

3.5.3.3.1 Airspace Control Order. Normally the ACA publishes and distributes the ACO daily. The ACO modifies guidance and/or procedures in the ACP, activates/deactivates procedural control measures, and updates positive control procedures, including identification friend or foe (IFF) codes.

3.5.3.3.2 ACO Development. The ACP contains the procedures for developing the ACO.

3.5.3.3.3 ACO Distribution. Two important considerations for the ACO are its timing and means of dissemination. The ACO cycle may be tied to the air tasking order ATO cycle or it may be published separately. Whatever means are used, it is important that the airspace users receive pertinent airspace information as soon as possible so they can include it in their mission planning.

3.5.3.3.4 ACO Execution. Clear, simple instructions in the ACO provide the basis for decentralized execution. This minimizes the impact on operations while maximizing the safe, efficient, and flexible use of airspace in the combat zone. This unimpeded flow of essential information to the component operational units and control elements gives the airspace users a current roadmap to follow and provide the component control elements with the means to regulate the airspace control function and resolve real-time conflicts.

3.5.3.4 ICAC2 Information Flow

Specific information that must be disseminated to execute the airspace control function includes:

3.5.3.4.1 Airspace Control Plan (ACP). The approved ACP is disseminated to all users of the airspace control system. Depending on the amount of strategic warning, the ACP will be distributed in hard copy, either by message as part of the OPLAN/OPORD, or as a stand-alone document.

3.5.3.4.2 Airspace Control Means Requests. Users request airspace control measures by submitting the airspace control means request (ACMREQ) in standard USMTF. The ACA establishes the timeliness for submitting these requests and includes the timeliness in the ACP. Approved ACMREQs appear in the complete ACO.

3.5.3.4.3 Deconfliction. As each component's airspace control requests are consolidated and integrated at the JACC or, if authority is delegated, at the sector airspace control authority's senior commander element, there is a need to deconflict the activities. Based on technological advances and the proliferation of airspace users on the battlefield, deconfliction cannot be accomplished using time-consuming procedures. The process requires an accurate computer data base loaded with all airspace activity

and a software capability to identify any conflicts requiring resolution. Once a conflict is identified, the dialogue to resolve the conflict must be accomplished in real-time over C2 nodes because of the time constraints involved.

3.5.3.4.4 Airspace Control Orders (ACO). The ACO is published and distributed to the applicable functional/service components' senior command facilities and other elements of the functional/service components' C2 system. Normally the ACO covers a 24-hour period and may be distributed by message, either as part of the ATO or as a separate document.

3.5.3.4.5 Air Traffic Control. Airspace control methodology is an effective combination of positive and procedural control. Positive control relies on positive identification, tracking, and direction of aircraft by an authorized control facility using electronic means. Procedural control may rely on nonelectronic means, on one hand, or on airspace control measures documented in the ACP (preplanned) or ACO (temporary). Between these two extremes, air traffic control facilities will execute flight following, monitoring, and terminal control. Necessary exchange of information between the air traffic control facilities and the airspace users requires reliable voice and data nets, radars, and identification friend or foe/selective identification feature (IFF/SIF).

3.5.3.4.6 Real-Time Deconfliction. Despite efforts by the airspace control facilities to resolve all conflicts before publishing the ACO, there will be cases where potential conflicts arise as a result of changes in the tactical situation. Since regulation of the airspace control function is decentralized to the maximum extent possible through the ACO, real-time conflicts are usually resolved at the lowest echelon. Such deconfliction requires fast reliable communications between the conflicting airspace users and the appropriate airspace control element. The responsible airspace

control element resolves the conflict based on established guidelines, insuring that the decision is timely and has minimal impact on overall mission objectives.

3.5.3.5 Connectivity

3.5.3.5.1 Critical Nodes. Primary interfaces for planning, implementing, and executing the airspace control function are the ACA, sector airspace control authorities, and the functional/service components' senior command elements. Secondary agencies that also conduct aviation activities that require close coordination and integration include the JFACC, AADC, combined force headquarters, and the host nation airspace organization. Specific primary and secondary agencies include:

- JACC
- JFACC
- Air Force AOC
- Air Force CRC
- Air Force ASOC
- Navy TACC of AAWC
- Navy Supporting Arms Coordination Center (SACC)
- Navy Air Element Coordination
- Marine Corps Tactical Air Command Center
- Marine Corps Tactical Air Operation Center (TAOC)
- Marine Corps Direct Air Support Center (DASC)
- Marine Corps Fire Support Coordination Center (FSCC)
- Army BCE
- Army Corps CP
- AADC
- Combined forces
- Host nation.

3.5.3.5.2 Communication Linkage. Communications interoperability is the key to timely, reliable distribution of critical airspace information. *The Joint Tactical Air Operations Procedural Handbook*, dated 31 Jul 87, and Joint Tactical Command, Control and Communications Agency Report, Number 8006, *Functional C3 Interoperability Architecture for Air Defense and Airspace Control*, dated 31 May 88, provide the airspace communication planner with current, pertinent information on available connectivity between critical airspace control nodes.

SECTION IV
A2C2 FUNCTIONAL DEFICIENCIES

SECTION IV
A2C2 FUNCTIONAL DEFICIENCIES

4.1 INTRODUCTION

The purpose of this section is to identify and address the deficiencies in the A2C2 system as it is currently employed to support the ground commander in the theater of operations. The A2C2 system is defined as consisting of those actions, or functions, that ensure the synchronized use of airspace and enhance the command and control of those forces using airspace in the conduct of combat operations. As previously stated in the Section III, the functions of airspace control consist of coordination, integration, regulation and identification. To conduct these functions, the Army employs an A2C2 system that includes organizations, personnel, facilities, and procedures. It has been determined that, within each component of the existing A2C2 system, there are deficiencies that prevent the system from functioning at the required level of efficiency and effectiveness. Further degradation of the existing system may occur as the Army implements the projected requirements of the FORCPAC2 concept for future combat operations.

4.2 DEFICIENCIES ASSESSMENT

4.2.1 Background

Actions taken since the conclusion of Operation Desert Shield/Storm have given impetus to the assessment of the effectiveness of the existing A2C2 system. Based on the importance and magnitude of operations in that conflict, the Army developed and documented extensive lessons learned on all aspects, including the effectiveness of the A2C2 system. The ODSS experience provided valuable information about the performance of the A2C2 system, in

terms of both its positive and negative values, in support of combat operations. This empirical data indicated significant deficiencies and shortcomings in A2C2 system functionality during its ODSS employment. The lessons learned in ODSS support the need for further analyses of the A2C2 system and form a basis for developing remedial courses of action prior to employing the system in future conflicts.

A USAAVNC A2C2/ATS conference in February, 1993, specifically focused on the various problem areas of the existing A2C2 and related ATS systems. This conference developed numerous issues based on deficiencies of the A2C2/ATS systems as they were employed in ODSS, and as they continue to operate at the present time. These issues subsequently were assigned, tentatively, to the doctrine, training, leader development, organization, materiel, and soldier (DTLOMS) domains. The results of the conference, associated documentation of ODSS lessons learned, and perceptions from other sources combined to provide an Army preliminary assessment of A2C2/ATS deficiency based issues.

4.2.2 Preliminary Assessment: Baseline Deficiencies

Table 4-1 summarizes the baseline deficiencies identified in the Army's preliminary assessment of the A2C2/ATS systems. The deficiencies, in turn, were to be translated into issues that this A2C2 Action Plan would resolve. Initially, this plan was developed to address the issues associated with both the A2C2 and ATS systems. At the A2C2 Action Plan Conference held at Fort Leavenworth on 20-21 July 1993, it was decided that the ATS system issues would be addressed separately and this action plan would be limited to addressing the A2C2 system. For historical purposes, Table 4-1 retains the complete results of the preliminary assessment.

CATEGORY/ DOMAIN	#	DEFICIENCIES (ISSUES)	NOTE:
CONCEPT DEVELOPMENT	1.	There is no concept for Army warfighting airspace.	1
	2.	The ATS concept does not support the warfighting airspace.	1
	3.	FOC/FCC is an inappropriate name for the A2C2 function.	1
	4.	A2C2 is not integrated across all battle labs.	1
DOCTRINE	1.	Army capstone airspace management/A2C2 doctrine is not current:	1,3
		a. Terminology for airspace and A2C2 inappropriate.	1
		b. Primary role for A2C2 unclear.	1
		c. A2C2 operational and tactical doctrine not horizontally and vertically integrated.	1
		d. A2C2 not tied into joint doctrine (i.e., JCS Pub 3-52[T], Doctrine for Joint Airspace Control in Combat Zone)	1,4
		e. A2C2 not integrated into combat operations or maneuver scheme.	1
		f. No effective en route airspace control.	9
		g. Subject-matter experts do not work the ICAC2 system.	1
		h. ATO, SPIN, ACO not transmitted to divisions, brigades, and battalions.	1,2,4,6,8,9
		i. Current system does not allow for timely updates of the ACO.	1
	2.	A2C2 doctrinal publications are not joint service publications.	1
	3.	A2C2 is not integrated into fire support planning.	1
	4.	Appendix A to ICAC2 does not reflect current A2C2 doctrine.	1
	5.	Land component commander's third dimension airspace requirements are not identified.	1
	6.	Ground commander's airspace management authority is not documented (e.g., deep attack of ground targets beyond FSCL, adjustments to coordinating altitude above his airspace).	3
	7.	Airspace clearance coordination and synchronization is not timely or responsive.	1,5,9
	8.	The ATCCS architecture does not identify A2C2/ATS communications requirements (i.e., ground-to-air high frequency net and FM 1-120 requirements).	1
	9.	Special A2C2 requirements for SEMA and UAV are not identified. Examples of requirements:	1
		a. Preplanned mode (24- to 48-hour lead time).	
		b. Immediate mode (30-minute lead time).	
		c. Inflight modification to planned and coordinated mission request.	
	10.	Enemy air defense threat is not available to air liaison officer or G3 Air.	1

Table 4-1. Army's A2C2/ATS Preliminary Assessment

CATEGORY/ DOMAIN	#	DEFICIENCIES (ISSUES)	NOTE:
TRAINING	1.	The number of trained A2C2 personnel does not meet Army requirements.	1
	2.	Staffs do not follow A2C2 procedures.	4
	3.	Continuous coordination of airspace is not conducted by staffs.	4
	4.	AGOS-trained or qualified personnel do not have an additional skill identifier.	1
	5.	Current simulations do not test A2C2 concerns.	1,3
	6.	There is no airspace command and control scenario.	1
	7.	TACPS teams do not perform to the same collective proficiency as USAF combat control teams (CCT).	1
	8.	G3 Air cannot accomplish assigned duties.	6
LEADER DEVELOPMENT	1.	Commanders do not fully articulate overall, detailed A2C2 operations or functions.	1
	2.	There is a lack of emphasis on A2C2 and joint attack training.	3
ORGANIZATION	1.	A2C2 force organization does not support various contingencies.	1
	2.	BCE cannot sustain its 24-hour mission.	1,3,8
	3.	There is no dedicated Army liaison officer to the BCE.	3
	4.	ALOs are not provided at EAC.	3
	5.	There are insufficient GLOs to augment existing GLOs at undesignated Air Force units during war.	3
	6.	A2C2 at ECB operates on ad hoc basis.	3
MATERIEL	1.	BCE cannot communicate.	1
	2.	BCE has no automation capability.	1
	3.	There are no dedicated equipment sets for A2C2.	1
	4.	There is no automation/communications connectivity between the USAF CTAPS and the MCS.	1,7,8
	5.	MCS does not interface or connect with the ATS.	1
	6.	Current equipment does not meet warfighting airspace requirements.	1
	7.	A2C2 functions are not automated.	1,7,8
	8.	A2C2 equipment cannot be transported by C130 aircraft.	1
	9.	A2C2 equipment does not provide weather information.	1
	10.	A2C2 elements cannot communicate classified information.	1
	11.	Army cannot connect in an automated mode with the USAF (or other services) airspace management systems(s).	2,3,7,8
	12.	Aircraft failed to achieve proper IFF (Mode 1 through 4) responses.	9

Table 4-1. A2C2 Preliminary Assessment (Continued)

CATEGORY/ DOMAIN	#	DEFICIENCIES (ISSUES)	NOTE:

NOTE SOURCES:

1. USAAVNC A2C2/ATS Conference, Feb 93
2. Center for Army Lessons Learned Newsletter, 92-1, Jan 92
3. A2C2 Major Issues, (undated)
4. Point Paper on A2C2 Concerns, ACC-JPO (undated)
5. Battle Command Training Program (BCTP) Perceptions, 21 May 92.
6. Battle Command Training Program (BCTP) Perceptions for Air Liaison Officers, Feb 93.
7. Army Battlefield Targeting Issue Sheet No. CAC 004,
   TITLE: Army Airspace Command and Control Automation Interface
8. Command and Control Observation #4, (undated)
9. Desert Shield/Storm Lessons Learned (Draft), (undated)

Table 4-1. A2C2 Preliminary Assessment (Continued)

4.3 ASSESSMENT

The objectives of this assessment of A2C2 deficiencies were to: (1) verify those issues previously identified; and (2) identify other emerging corollary issues. The results of the deficiency assessment yielded findings upon which to base the definition of requirements necessary to support the resolution of the issues.

4.3.1 Methodology

The initial steps in conducting the assessment of A2C2 deficiencies included analyzing performance requirements and deficiencies the Army had identified in material provided from the preliminary assessment, and conducting a literature search for other related documentation. The object of the analysis was to identify the deficiency in terms of a standard (if available) or requirement without specifying a cause. This addressal focused the initial assessment on problem identification or verification rather than on substantiating the recommended solutions. Based on the insight gained from this analysis of the preliminary assessment and the review of doctrinal literature on the subject of A2C2, the researchers planned and conducted an information collection effort to verify the identified deficiencies and to determine if any additional deficiencies and related issues existed. This effort was also intended to obtain field information on the extent (whether widespread among a number of units or isolated) and gravity (impact on unit mission capabilities, safety, or security) of the deficiencies.

The research team chose site visits and interviews with key A2C2 personnel as the methods for collecting the required information on the A2C2 system. Additional benefits of using this method were the opportunities to meet with many representatives of activities, agencies, organizations, and units currently constituting the A2C2 community, and to discuss issues with them.

Based on the backgrounds, including significant ODSS experience, and the current in-depth A2C2 involvement of these representatives, the research team gained valuable insights for further consideration as it developed the A2C2 Action Plan. Table 4-2 lists the sites visited, and the activities, agents, organizations, and units interviewed. Often, individuals at these locations offered proposed solutions to the A2C2 deficiency. However, the analysts held these tentative resolutions in abeyance until the team could determine the full cause of the deficiency. The researchers, therefore, avoided tailoring deficiency statements to justify identified solutions.

The framework for conducting discussions and interviews at each site or unit was based on the deficiencies identified in the preliminary assessment and other related documentation pertaining to A2C2 DTLOMS. The research team collected information on the A2C2 system from personnel responsible for operational employment and utilization, doctrinal and organizational development, training of personnel, and efforts to support materiel requirements. The information collection effort began at the U.S. Air Force Air Ground Operations School (AGOS). Discussions there were based on the joint perspective of airspace control in the theater of operations. Focus of the discussions was on the combat airspace command and control doctrine, techniques, and procedures required to effectively integrate all air and ground elements into joint combat operations, and the training required to effectively support these functions. Interviews at AGOS with U.S. Army Element personnel and U.S. Air Force staff members provided valuable insight into the overall joint air-ground system within which A2C2 must function. These personnel had unique perspectives on deficiencies, and provided valuable leads and points of contact for subsequent expansion of these views during follow-on interviews with Army A2C2 personnel.

SITE	ACTIVITY/AGENCY/ORGANIZATION/UNIT
Hurlburt AFB	Air Ground Operations School (AGOS)
Fort Rucker	U.S. Army Aviation Center and School
	Air Traffic Control Activity (ATCA)
Fort Sill	U.S. Army Field Artillery Center
Fort Huachuca	U.S. Army Intelligence Center
Fort Bliss, TX	U.S. Army Air Defense Center
Fort Benning	U.S. Army Infantry Center
Fort Knox	U.S. Army Armor Center
Fort Bragg	18th Aviation Brigade 1st Battlefield Coordination Detachment 1/58th Air Traffic Services (ATS) Battalion
Fort Campbell	101st Airborne Division (Air Assault)
Fort Stewart	24th Infantry Division (Mechanized)
Aberdeen Proving Ground	29th Air Traffic Control (ATC) Group (Maryland National Guard)
Fort Monmouth	Project Manager - Operational Tactical Data Systems (PM-OPTADS)
Fort Leavenworth	Combined Arms Command (CAC): • CAC-Training (CAC-T) • Battle Command Training Program (BCTP) • CAC, Combat Developments (CAC,CD) • Air Combat Command (ACC) Joint Program Office (JPO) National Simulation Center (NSC) Center for Army leadership (CAL)
Langley AFB	Air Land Sea Applications Agency (ALSA)
Fort Monroe	HQ, Training and Doctrine Command (TRADOC)

TABLE 4-2. A2C2 Information Collection Site Visits

Subsequent visits and interviews were conducted at the locations of the BFA proponents of maneuver (aviation, infantry, armor), fire support, intelligence and electronic warfare, and air defense. From these proponents, the analysts obtained the BFA perspectives of the A2C2 doctrine, training, leader development, and organization deficiencies. Researchers visited operational A2C2 elements in the field at the echelon above corps (EAC) and at echelons corps and below (ECB). The purpose of these visits was to gain perspectives on the functional, organizational structure, procedural, and individual/unit training deficiencies of the A2C2 system as currently fielded. While collecting information at EAC, the analysts placed particular emphasis on the role of the BCE. As the focal point for coordination and integration of air and ground (and naval as required) operations between the designated JFACC and the land component commander, the BCE is a vital link in conducting A2C2 functions. Additional visits and interviews also contributed information on the aspects of concepts and doctrine development, materiel development, and training and simulation, as they support A2C2.

4.3.2 Findings

Results of the site visits were used to verify those deficiencies the Army had identified in the preliminary assessment, as well as to determine if there were other emerging A2C2 issues.

In general, the discussions at the locations visited did verify the A2C2 system deficiencies (issues) baseline in the Army's preliminary assessment (Table 4-1). As expected, all activities/agencies/organizations/units, because of their varied areas of interest and subject-matter expertise, did not universally verify all deficiencies. However, the cumulative results of the discussions strongly supported the premise that the existing A2C2 system was dysfunctional, and that the preliminary assessment was

valid as a listing of contributing factors to the deficiencies and shortcomings of the system.

In addition to substantiating the preliminary assessment, the site visits determined that there were key deficiency-based issues that were foremost in the minds of the representatives contacted. Doctrinally, it appears that there is a lack of the updated tactics, techniques, and procedures (TTP) that are needed for the A2C2 system to effectively support the FORCPAC2 concept. The TTP are needed, within Army doctrine, to more effectively support joint doctrine. Training deficiencies centered on providing qualified A2C2 personnel to staffs, supporting unit training in A2C2, enhancements to joint exercises, and more emphasis to A2C2 through leader development. Organizationally, it is generally agreed that there is a lack of qualified personnel to staff A2C2 elements at all echelons. The analysts found the A2C2 structure to be deficient within the BCE, and at brigade and below. From a materiel aspect, there is a strong consensus that the lack of *effective communications* as well as the lack of automation support for A2C2 is a major deficiency.

To summarize the findings resulting from the site visits, Table 4-3 was developed to present a compilation of the previously identified deficiencies from the preliminary assessment, and those emerging from the discussions with personnel at the sites. Each deficiency was assigned to one or more of the DTLOMS domains, as applicable.

At the A2C2 Action Plan conference on 20-21 July 1993, review of these deficiency-based issues resulted in the elimination of some and modification of others by consensus. Table 4-3 presents the revised issues that are based on actions taken at the conference and the review of the final draft of the plan.

Nr	Issue	Doc	Tng	Ldr	Org	Mtl	Sdr
1	Lack of an A2C2 concept to support land component commander's synchronization of the third dimension of maneuver at all echelons across the operational continuum. A2C2 concept is not adequate (e.g., deep attack, primary role of A2C2, horizontal/vertical integration, special electronic mission aircraft [SEMA]/unmanned aerial vehicles [UAV], coordinating altitude, space-based systems, operations other than war, battle space, real-time position location). Concept needs to identify ground commander's airspace management requirements in support of joint doctrine.	•					
2	Lack of updated A2C2 capstone doctrine to support joint doctrine for theater operations including operational and tactical requirements of the force projection Army command and control (FORCPAC2). Updated doctrine needs to be incorporated, in terms of TTP, in all affected field manuals.	•	•		•		•

Table 4-3. A2C2 Deficiency-Based Issues (Revised)

Nr	Issue	Doc	Tng	Ldr	Org	Mtl	Sdr
3	Lack of adequate integration/synchronization of Army aviation, fire support, air defense, SEMA/UAV, and special operations forces (SOF) operations with A2C2 at all echelons. Army TTP require updating (e.g., full integration of A2C2 into operations and fire support planning, en route airspace control, air tasking order/special instructions/airspace control order distribution and update, threat dissemination, electronic warfare [EW] employment, and SOF operations).	•	•	•	•	•	•
4	Lack of adequately trained A2C2 personnel in active and reserve components (AC and RC). A2C2 training requirements are not quantified (e.g., additional skill identifier [ASI] and coding tables of organization and equipment [TOE] with ASI) in the training management system.		•	•	•		•
5	Lack of adequate A2C2 play in Army exercises and at training centers. • A2C2 functions are not fully integrated in training exercises/ scenarios. • Lack of A2C2 simulations to support training programs. • Lack of realistic penalties in simulations for substandard performance.		•	•		•	•

Table 4-3. A2C2 Deficiency-Based Issues (Revised) (Continued)

Nr	Issue	Doc	Tng	Ldr	Org	Mtl	Sdr
6	Low training emphasis in A2C2 procedures (i.e., commanders not articulating overall A2C2 operations or functions, and staffing of A2C2 positions).		•	•			•
7	Lack of adequate A2C2 personnel in units in corps and division TOEs. • Low percent of fill against requirements and high turnover rate. • A2C2 force organization does not support various contingencies (e.g., no corps liaison officer [LNO] to battlefield coordination element [BCE], no aviation liaison officers assigned below corps, ad hoc organization at ECB. • A2C2 position requirements are not accurately documented. • A2C2 functions at ECB often fall to ATS personnel or ad hoc organizations.		•	•	•		•
8	Lack of adequate BCE staffing (quantity) in airspace management section to conduct continuous operations in joint environment across the operational continuum. BCE TOE does not support current warfighting requirements (i.e., 24-hour operations, military intelligence [MI] aviation expertise). The BCE is unable to coordinate UAVs, SOF, SEMA, and Army tactical missile system (ATACMS) with existing staff.		•		•	•	•

Table 4-3. A2C2 Deficiency-Based Issues (Revised) (Continued)

Nr	Issue	Doc	Tng	Ldr	Org	Mtl	Sdr
9	Lack of A2C2 element organizational capabilities at brigade and below to support commander's use of three dimensional battle space.				•		
10	Lack of effective communications/automation capabilities to support A2C2 requirements for systems integration (horizontal/ vertical) at all echelons to achieve intra-Army and interservice connectivity. A2C2 automation equipment has deficiencies (i.e., equipment capability, connectivity, transportability). Army units lack automated interfaces with the USAF's contingency theater air control system (TACS) automated planning system (CTAPS) and the U.S. Navy's joint maritime command information system (JMCIS).				•	•	
11	Lack of full utilization of Army tactical command and control system (ATCCS) architecture to support A2C2 requirements. Current ATCCS architecture does not identify A2C2 requirements (e.g., automation of information distribution, coordination of joint operations, deconfliction, and integration with ground commander's operations and maneuver).				•	•	

Table 4-3. A2C2 Deficiency-Based Issues (Revised) (Continued)

Nr	Issue	Doc	Tng	Ldr	Org	Mtl	Sdr
12	Lack of BCE communications/ automation capabilities critical to the support of interfaces with both joint force land component commander and JFACC. Automation deficiencies exist in terms of capability, connectivity, and transportability. The standard theater Army command and control system (STACCS) does not provide A2C2 information or interface with the JFACC system.				•	•	
13	Lack of capability at the corps and division maneuver elements to effectively manage their allocated airspace. Maneuver commanders lacking the real-time position information capability needed to support effective management of their airspace and its users.				•		
14	There is a need to integrate the examination of A2C2 in all battle labs.	•	•	•	•	•	•

Table 4-3. A2C2 Deficiency-Based Issues (Revised) (Continued)

SECTION V
A2C2 REQUIREMENTS DEFINITION

SECTION V
A2C2 REQUIREMENTS DEFINITION

5.1 INTRODUCTION

This section introduces the requirements to correct the A2C2 system performance or capabilities deficiencies previously identified in this study. Using the categorization by DTLOMS domain of these deficiencies, requirements are established within each applicable domain to correct these deficiencies. The result is a series of recommended solutions for each of the defined requirements. The solutions are presented in the issue sheets located in Annex A. These issue sheets also identify responsibilities for correcting identified A2C2 deficiencies and establish timelines for accomplishing the corrections.

5.2 DEFICIENCY-BASED REQUIREMENTS

Examination and research into the deficiencies identified in Section IV led to establishing requirements for changes and additions. Analysts defined the requirements based on the identified or probable causes of A2C2 deficiencies. While the preliminary assessment had categorized individual issues into DTLOMS domains, the study found that many issues were subsets of larger issues within each domain. Therefore, the analysts determined the requirements for the larger issue. However, each subordinate issue still retains visibility within the larger parent issue. The requirement for each issue is so drawn as to provide a solution for each subordinate issue.

Each corrective requirement is based on the actions necessary to correct deficiencies or shortcomings in concepts or doctrine, skill or knowledge, leadership development, organizational structure, and equipment or material. In some

cases, the requirement to solve the deficiency is based on a combination of these causes.

5.3 A2C2 SOLUTIONS

The recommended solutions define, in detail, the requirements that are necessary to correct or satisfy the A2C2 deficiencies identified in this study. The deficiencies are identified in Table 4-3 in Section IV. Table 5-1 restates the issues. However, rather than simply identifying the functional domains into which the solution to the issue falls, Table 5-1 references an issue sheet that applies under the appropriate DTLOMS domain (no solutions are identified under the "Sdr" column, but it is understood that all affect the soldier). Each issue, under the applicable DTLOMS domain, is assigned a number. These numbers (e.g., D-1) correspond to the issue sheet, found in Annex A, that provides the recommended solutions, responsibilities, and timelines for resolution. As stated in Section IV, some issues have solutions that fall within two or more domains. In these cases, recommended solutions for both domains are found in the first identified issue sheet (e.g., T-2 also contains M-1). Each of the recommended solutions addresses the subordinate issues contained within the numbered issues. The last issue, Number 13 "INTEGRATE A2C2 ACROSS ALL BATTLE LABS" crosses all DTLOMS domains, in accordance with the battle lab requirements definition concept. In this section, the issues presented are those supported by consensus at the CAC,CD A2C2 Action Plan Conference on 20-21 July 1993 and subsequent review of the plan in final draft.

This study identifies several issues that have major impact on long-term resolution of identified A2C2 deficiencies. Significant issues are:

- There is a lack of A2C2 concept (issue 1). This concept will determine subsequent DTLOMS requirements for A2C2.

- The lack of A2C2 training emphasis by commanders (issue 6) is a major contributor to A2C2 staffs being unable to perform their tasks.

- The BCE is not staffed for continuous operations in a joint environment (issue 8). Its organization must support 24-hour operations and the requirement to coordinate precision weapons systems and surveillance platforms.

- The current A2C2 system lacks effective communications and automation capabilities to support its horizontal and vertical integration requirements (issue 10). To be effective, the A2C2 system must have intra-Army and interservice connectivity at all echelons.

5.4 ISSUE SHEETS

Annex A contains issue sheets that establish the requirements to resolve the identified A2C2 deficiencies. The sheets are designed to stand alone by providing the issue, affected echelons and BFAs, background, and discussion. Each issue sheet provides time frame(s) for satisfying the requirement. The time frames used are defined as --

- Near-term: one to one and one-half years
- Midterm: two to three years
- Long-term: four years or longer.

Each issue sheet also provides recommendations that explain the rationale for required actions, agents responsible for each action, and milestones for completion of each action. Where possible, the sheet estimates the resources necessary to satisfy the deficiency-based requirement.

Nr	Issue	Doc	Tng	Ldr	Org	Mtl	Sdr
1	Lack of an A2C2 concept to support land component commander's synchronization of the third dimension of maneuver at all echelons across the operational continuum. A2C2 concept is not adequate (e.g., deep attack, primary role of A2C2, horizontal/vertical integration, special electronic mission aircraft [SEMA]/unmanned aerial vehicles [UAV], coordinating altitude, space-base systems, operations other than war, battle space, real-time position location). Concept needs to identify ground commander's airspace management requirements in support of joint doctrine.	D-1				M-2 M-5	
2	Lack of updated A2C2 capstone doctrine to support joint doctrine for theater operations including operational and tactical requirements of the force projection Army command and control (FORCPAC2). Updated doctrine needs to be incorporated, in terms of TTP, in all affected field manuals.	D-2					

Table 5-1. A2C2 Solutions (Revised)

Nr	Issue	Doc	Tng	Ldr	Org	Mtl	Sdr
3	Lack of adequate integration/synchronization of Army aviation, fire support, air defense, SEMA/UAV, and special operations forces (SOF) operations with A2C2 at all echelons. Army TTP require updating (e.g., full integration of A2C2 into operations and fire support planning, en route airspace control, air tasking order/special instructions/airspace control order distribution and update, threat dissemination, electronic warfare [EW] employment, and SOF operations).	D-3					
4	Lack of adequately trained A2C2 personnel in active and reserve components (AC and RC). A2C2 training requirements are not quantified (e.g., additional skill identifier [ASI] and coding tables of organization and equipment [TOE] with ASI) in the training management system.		T-1				

Table 5-1. A2C2 Solutions (Revised) (Continued)

Nr	Issue	Doc	Tng	Ldr	Org	Mtl	Sdr
5	Lack of adequate A2C2 play in Army exercises and at training centers. • A2C2 functions are not fully integrated in training exercises/ scenarios. • Lack of A2C2 simulations to support training programs. • Lack of realistic penalties in simulations for substandard performance.		T-2			M-1	
6	Low training emphasis in A2C2 procedures (i.e., commanders not articulating overall A2C2 operations or functions, and staffing of A2C2 positions).		T-3	L-1			

Table 5-1. A2C2 Solutions (Revised) (Continued)

Nr	Issue	Doc	Tng	Ldr	Org	Mtl	Sdr
7	Lack of adequate A2C2 personnel in units in corps and division TOEs. • Low percent of fill against requirements and high turnover rate. • A2C2 force organization does not support various contingencies (e.g., no corps liaison officer [LNO] to battlefield coordination element [BCE], no aviation liaison officers assigned below corps, ad hoc organization at ECB. • A2C2 position requirements are not accurately documented. • A2C2 functions at ECB often fall to ATS personnel or ad hoc organizations.				O-1		
8	Lack of adequate BCE staffing (quantity) in airspace management section to conduct continuous operations in joint environment across the operational continuum. BCE TOE does not support current warfighting requirements (i.e., 24-hour operations, military intelligence [MI] aviation expertise). The BCE is unable to coordinate UAVs, SOF, SEMA, and Army tactical missile system (ATACMS) with existing staff.				O-2		

Table 5-1. A2C2 Solutions (Revised) (Continued)

Nr	Issue	Doc	Tng	Ldr	Org	Mtl	Sdr
9	Lack of A2C2 element organizational capabilities at brigade and below to support commander's use of three dimensional battle space.				O-3		
10	Lack of effective communications/automation capabilities to support A2C2 requirements for systems integration (horizontal/ vertical) at all echelons to achieve intra-Army and interservice connectivity. A2C2 automation equipment has deficiencies (i.e., equipment capability, connectivity, transportability). Army units lack automated interfaces with the USAF's contingency theater air control system (TACS) automated planning system (CTAPS) and the U.S. Navy's joint maritime command information system (JMCIS).	D-1				M-2 M-5	
11	Lack of full utilization of Army tactical command and control system (ATCCS) architecture to support A2C2 requirements. Current ATCCS architecture does not identify A2C2 requirements (e.g., automation of information distribution, coordination of joint operations, deconfliction, and integration with ground commander's operations and maneuver).					M-3	

Table 5-1. A2C2 Solutions (Revised) (Continued)

Nr	Issue	Doc	Tng	Ldr	Org	Mtl	Sdr
12	Lack of BCE communications/ automation capabilities critical to the support of interfaces with both joint force land component commander and JFACC. Automation deficiencies exist in terms of capability, connectivity, and transportability. The standard theater Army command and control system (STACCS) does not provide A2C2 information or interface with the JFACC system.					M-4	
13	Lack of capability at the corps and division maneuver elements to effectively manage their allocated airspace. Maneuver commanders lacking the real-time position information capability needed to support effective management of their airspace and its users.	D-1				M-5 M-2	
14	There is a need to integrate the examination of A2C2 in all battle labs.	D-1, 2,3	T-1, 2,3		O-1,2,3	M-1,2,3,4,5	

Table 5-1. A2C2 Solutions (Revised) (Continued)

ANNEX A
ISSUE SHEETS

ISSUE: DOCTRINE - 1

TITLE: LACK OF CURRENT A2C2 CONCEPT **DATE:** 1 Sep 1993

NUMBER: D-1 (M-2 and M-5)

ECHELON(S): All

BATTLEFIELD FUNCTIONAL AREA(S): Maneuver, Fire Support, Air Defense, Intelligence and Electronic Warfare, and Combat Service Support

TIME FRAME(S): Near-term

ISSUE: Existing A2C2 doctrine is not based on a concept that supports the land component commander's (LCC's) current airspace coordination, integration, regulation, and identification requirements. A revised A2C2 concept must provide the principles that govern synchronization of the third dimension of maneuver at all Army echelons across the operational continuum within a force projection environment.

BACKGROUND: The new Field Manual (FM) 100-5, *Operations*, provides the warfighting doctrine for the force projection Army. It details the Army's participation in prevalent joint and combined operations, and elevates the importance of operations other than war in the force projection environment. It defines battle space within the battlefield framework for planning and executing operations, and describes how commanders are to think about battlefield organization in terms of deep, close, and rear operations. The post-cold war Army will support the national military strategy of force projection through the implementation of a force projection Army command and control (FORCPAC2) concept.

Joint and multiservice doctrine on airspace management and control is under revision. A revised Joint Publication (JP) 3-52, *Doctrine for Joint Airspace Control in a Combat Zone*, is in test

format. FM 100-3-1, *Multiservice Procedures for Integrated Combat Airspace Command and Control (ICAC2)*, is being published. The latter provides the tactics, techniques, and procedures (TTP) that bridge between joint and service doctrine, and details the latest A2C2 missions, functions, and procedures. It establishes new procedures for deconflicting the Army Tactical Missile System (ATACMS) and unmanned aerial vehicles (UAVs); however, it does not conceptualize the LCC's current A2C2 and warfighting airspace requirements. Army programs for precision strike weapons and target acquisition will increase the LCC's requirements for the integration and regulation of deep operations. The unique environments of combined operations and operations other than war will affect A2C2 at all Army echelons.

DISCUSSION: Recent military operations demonstrated the increased complexity of managing airspace in joint and combined environments. Deep operations by Army aviation and nonlinear deployment of forces presented challenges to traditional airspace control measures and functions. In future operations, emerging technologies in precision weapons, target acquisition, and information systems will require new perspectives on the management of joint-use airspace. The implementation of the force projection doctrine and its supporting FORCPAC2 concept will also affect the existing A2C2 concept.

The revised A2C2 concept may require defining "warfighting airspace." This airspace has been described as the three-dimensional volume above the ground commander bounded by the area of operations and the coordinating altitude. The A2C2 concept should delineate the LCC's control, coordination, and integration authority within this area.

The unique civil-military atmosphere during operations other than war establishes new airspace coordination and control requirements. The A2C2 roles and functions of elements and staffs

at each Army command echelon require redefinition based on revised operational doctrine. The horizontal and vertical integration of these elements and staffs must be described accordingly.

RECOMMENDATIONS: Army doctrine must be based on an A2C2 concept that identifies the LCC's airspace management and integration requirements in support of joint doctrine. The planned revision of FM 100-103 (see issue D-2) must address A2C2 under the FORCPAC2 concept in concert with revised joint doctrine and operational concepts. The revised FM 100-103 must be founded on an A2C2 concept that addresses revised requirements and functions at all echelons across the operational continuum in light of emerging technological developments. This updated A2C2 concept is a necessary precursor for a revised A2C2 doctrine that determines resultant training, leader development, organization, and materiel requirements.

The new A2C2 concept should address --

- Any changed missions and roles for Army aviation
- New or revised airspace management control measures
- Maneuver elements' required capability to manage allocated airspace
- Brigade and battalion functions in support of the use of the third dimension in terms of capabilities, people, and equipment
- New or revised requirements for all branches in support of A2C2 missions and functions
- A2C2 automation and communications requirements.

ACTIONS/AGENTS: Prepare revised A2C2 concept: HQ, TRADOC and CGSC (Co-Lead); AHS, ALSA, CAC, USAADAS, USAARMC, USAAVNC, USAFAS, USAIC, USAIC&FH, and USASIGCEN (Assist).

RESOURCES: Estimated time for developing, coordinating, and publishing revised A2C2 concept: 120 man-days.

MILESTONES: A2C2 concept: Nov 93 (completion date may be accelerated, depending upon commitment of added resources).

ISSUE: DOCTRINE - 2

TITLE: LACK OF A2C2 CAPSTONE DOCTRINE **DATE:** 1 Sep 1993

NUMBER: D-2

ECHELON(S): All

BATTLEFIELD FUNCTIONAL AREA(S): Maneuver, Fire Support, Air Defense, Intelligence and Electronic Warfare, and Combat Service Support

TIME FRAME(S): Near-term

ISSUE: Current A2C2 doctrine does not support joint doctrine for theater operations, including operational and tactical requirements of force projection Army command and control (FORCPAC2). A2C2 requires a clear doctrinal hierarchy in terms of joint, Army, and proponent doctrine mixed with appropriate tactics, techniques, and procedures (TTP). There is Army and other service confusion as to what is the capstone A2C2 doctrine. Joint Publication (JP) 3-52 will provide the broad-based joint airspace control doctrine. Field Manual (FM) 100-103, *Army Airspace Command and Control in a Combat Zone*, should provide the linkage between joint doctrine and TTP.

BACKGROUND: FM 100-5, *Operations*, specifies that joint, combined, and interagency operations will be the norm for the force projection Army. Its tenets include the full range of military operations (i.e., war, conflict, peacetime) existing in a theater at one time. The FORCPAC2 concept captures these precepts in its description of the future threat and technological environment that dictate changes to the Army's command and control (C2) structure. FORCPAC2 recommends specific changes to C2, air defense, and intelligence automation and communications networks.

As stated in issue D-1, a revised JP 3-52, *Doctrine for Joint Airspace Control in a Combat Zone*, is in test format, and FM 100-3-1, *Multiservice Procedures for Integrated Combat Airspace Command and Control (ICAC2)*, is being published. The current doctrinal literature management plan (prescribed by TRADOC Reg 25-31, *TRADOC Armywide Doctrinal and Training Literature Program*) lists these related manuals:

- FM 1-103, *Airspace Management and Army Air Traffic in a Combat Zone* (1981)
- FM 100-26, *The Air-Ground Operations System* (1973)
- FM 100-28, *Doctrine and Procedures for Airspace Control in the Combat Zone* (1975)
- FM 100-42, *US Air Force and US Army Airspace Management in an Area of Operations* (1976)
- FM 100-103, *Army Airspace Command and Control in a Combat Zone* (1987).

The Air Land Sea Applications (ALSA) Agency is producing A2C2 doctrine that is unmanaged by the TRADOC doctrinal literature management plan. ALSA has been issued 100-series FM numbers with the following titles:

- FM 100-3-1, *Multiservice Procedures for Integrated Combat Airspace Command and Control*
- FM 100-XX, *Theater Air-Ground System*
- FM 100-XX, *Close Air Support*.

HQ, TRADOC message, ATCS, 041656Z Sep 92, subject: Changes to Doctrine Development Policy, specifies the streamlined procedures for doctrine development and approval. The draft program directive for revising FM 100-103 has been prepared in accordance with this guidance.

DISCUSSION: The revised FM 100-103 must consider the evolving TTP regarding joint and combined operations across the entire operational continuum. As capstone doctrine, it must also consider the streamlined C2 environment that the FORCPAC2 concept envisions. Just as FM 100-5 impacts on all doctrinal publications, the revised FM 100-103 will drive revisions to subordinate doctrinal publications concerning airspace command and control. This is an opportune time to make these fundamental doctrinal changes to support the force projection Army. FM 100-103 should be written in parallel with the A2C2 concept development (see issue D-1).

RECOMMENDATIONS: To resolve confusion over inconsistent doctrine, recommend that HQ, TRADOC establish FM 100-103 as the capstone A2C2 doctrinal manual. FM 100-103 should be revised to combine and supersede FM 100-26, FM 100-28, and FM 100-42. ALSA multiservice publications should be established as TTP manuals under FM 100-103. For example. *Multiservice Procedures for Integrated Combat Airspace Command and Control* should be numbered FM 100-103-1; *Theater Air-Ground System*, numbered FM 100-103-2; and *Close Air Support*, numbered FM 100-103-3.

The revised FM 100-103 should provide the updated TTP for --

- A2C2 elements and related staff functions at all echelons and their vertical and horizontal integration
- First-time doctrine for the battlefield coordination element (BCE) and for the ground liaison officers (GLOs) at various Air Force command echelons
- Special integration and coordination requirements for forces involved in the deep attack, special electronic mission aircraft (SEMA), unmanned aerial vehicles (UAVs), precision strike weapons (including the Army tactical missile system [ATACMS]), operational support airlift (OSA), and space-based systems

- Fire support, air defense, and aircraft positive and procedural controls
- Combined and interagency operations and operations other than war.

ACTIONS/AGENTS:

- Establish FM 100-103 as capstone A2C2 manual: TRADOC (Lead)
- Revise FM 100-103: CGSC (Lead); service, command, and component coordination, in accordance with its approved program directive.

RESOURCES: Resources for the revision of FM 100-103 should be programmed upon approval of the program directive specifying its revision and development. Estimated time for developing, coordinating, and publishing revised FM 100-103: 340 man-days.

MILESTONES: Milestones for revising FM 100-103, pending approval of the program directive, are:

- Initial draft: Jun 94
- Final draft: Nov 94
- Publish revised FM 100-103: fourth quarter, FY95.

ISSUE: DOCTRINE - 3

TITLE: LACK OF A2C2 INTEGRATION AND SYNCHRONIZATION AT ALL ECHELONS **DATE:** 1 Sep 1993

NUMBER: D-3

ECHELON(S): All

BATTLEFIELD FUNCTIONAL AREA(S): Maneuver, Fire Support, Air Defense, and Intelligence and Electronic Warfare

TIME FRAME(S): Near-term

ISSUE: Current A2C2 doctrine does not provide the tactics, techniques, and procedures (TTP) for integrating and synchronizing air and ground maneuver, fire support, air defense, special electronic mission aircraft (SEMA), unmanned aerial vehicles (UAVs), and special operations forces (SOF) operations with A2C2 at all echelons.

BACKGROUND: Synchronizing fire support with maneuver is critical in combat operations. Commanders at all levels use air support to increase their combat power. In joint operations, the air control order (ACO) (either a separate document or a part of the air tasking order [ATO]), provides the details of the approved requests for airspace control measures. Special instructions (SPINS) provide air defense/identification procedures. These documents also identify planned electronic warfare (EW) operations. They form the basis for deconflicting joint air operations, and for coordinating and integrating mission requirements in applying combat power. EW operations are also a part of fire support as a means to increase combat power. Since they are nonselective on targeted frequencies or bands, EW operations conducted by aerial platforms must be coordinated.

Army aviation aircraft utilize the entire area of the battlefield in support of the ground commander. Aircraft are used for combat support missions in the rear and close battlefield areas. Attack missions include close battle support as well as deep strike operations forward of the fire support coordination line (FSCL). All Army aviation operations need to be deconflicted and coordinated with other joint and combined arms operations.

Air defense provides the force protection needed to generate combat power. For counterair operations, the high-to-medium altitude air defense (HIMAD) systems are linked with the area air defense commander through control and reporting centers (CRCs). Intelligence operations also contribute to the effectiveness of combined arms operations. Currently, SEMA provide the commander real-time information collection and target acquisition capabilities. The future fielding of close- and short-range UAVs down to separate brigade level will present distinct challenges in terms of rapid, efficient coordination of their airspace requirements.

Unique A2C2 requirements exist when conventional forces operate in conjunction with SOF or deploy to a theater where SOF are already operating. At corps and echelons above corps (EAC), the battlefield coordination element (BCE), fire support coordinator (FSCOORD), special forces coordination (SOFCOORD) element, and joint target coordination board (JTCB) are key to this process.

A program directive for revising Field Manual (FM) 100-103 has been drafted in accordance with the latest TRADOC guidance on doctrine development, and the FM revision will follow (see issue D-2).

DISCUSSION: Technological advances have increased the combat power of the force projection Army. They have also compounded A2C2

integration and synchronization requirements. Commanders need the TTP that provide them the framework in which to operate in this dynamic environment.

Within this force projection environment, the early entry force must possess the required lethality to accomplish its mission and protect itself upon arrival in theater. A tailored force with sufficient assets (such as forward air defense artillery, SOF, airborne and air assault forces, attack aviation, EW, long-range precision munitions, and access to and influence over strategic and theater intelligence systems) might deter the enemy from attacking such critical functions as command and control (C2) nodes, logistics sustainability facilities, and maneuver formations. Since much of the deploying force's combat power comes from external units, fire support and A2C2 planning must be complementary. Fire support and airspace control measures must allow the commander to use all his organic and supporting assets to protect his forces as well as provide a sufficient degree of safety to aircraft within the warfighting airspace.

A2C2 elements and staffs must be able to use information provided in the appropriate portions of the ATO, its SPINS, and the ACO to coordinate and integrate their mission requirements. Planned broad-band jamming, identified in these documents, can be particularly disastrous to Army aviation operations unless coordinated in advance.

Air defense provides force protection situational awareness, and contributes to counter-air operations. HIMAD and short range air defense (SHORAD) systems must be fully integrated into the theater, corps, and division C2 architectures for both engagement and force operations. HIMAD systems, today, employ automated engagement operations using digital information links to higher and lower echelon units. The fielding of Forward Area Air Defense Command, Control, and Intelligence (FAADC2I) will provide automated

digital targeting information, situational awareness, and early warning for divisional forces.

The employment of SEMA and UAVs requires coordination of routes, altitudes, and immediate and preplanned missions. Since they are target-dependent, these assets must react to changes in target activities. Close-range UAVs will be fielded to military intelligence battalions and maneuver brigades. Their launch, recovery, and associated airspace requirements will change much faster than those of short-range UAVs. Short-notice missions will be the norm for these systems, and their smaller radar signature will make tracking difficult for airspace managers. UAV flight tracks and control procedures will pose special A2C2 challenges. Enemy air defenses located by SEMA and UAVs must be disseminated to A2C2 and targeting elements.

The Army's requirement to accomplish its mission across the full range of possible operations increases the likelihood of conventional force and SOF operations. These joint or combined operations require special airspace deconfliction efforts and close coordination of fire support, interdiction, and target acquisition missions.

RECOMMENDATIONS: The revision of FM 100-103 should update or provide A2C2 TTP at the appropriate echelon for the following:

- Integration and synchronization of A2C2 into operations, fire support, and air defense planning
- Use of information provided by portions of the ATO, ACO, and SPINS by A2C2 elements and system
- Procedures for coordinating planned and immediate aerial EW operations
- A2C2 intelligence requirements and dissemination

- Coordination of SEMA and UAV employment, particularly changes to preplanned missions because of target activity and the employment of close- and short-range UAVs
- Integration and coordination of SOF into conventional force A2C2 plans and operations at corps and EAC.

ACTIONS/AGENT: Revise FM 100-103: CGSC (Lead); service, command, and component coordination, in accordance with program directive.

RESOURCES: Resources for the revision of FM 100-103 should be programmed upon approval of the program directive specifying its revision and development. Estimated time for developing, coordinating, and publishing revised FM 100-103: 340 man-days.

MILESTONES: Milestones for revising FM 100-103, based on an approved program directive, are:

- Initial draft: Jun 94
- Final draft: Nov 94
- Publish revised FM 100-103: fourth quarter, FY95.

ISSUE: TRAINING - 1

TITLE: LACK OF TRAINED A2C2 PERSONNEL **DATE:** 1 Sep 1993

NUMBER: T-1

ECHELON(S): All

BATTLEFIELD FUNCTIONAL AREA(S): Maneuver, Fire Support, Air Defense, Intelligence and Electronic Warfare, and Combat Service Support

TIME FRAME(S): Near-term

ISSUE: Personnel occupying A2C2 staff positions in some units do not possess the required skills or knowledge to perform A2C2 planning, coordination, integration, and deconfliction functions. A2C2 training requirements are not quantified in the training management system.

BACKGROUND: Tables of organization and equipment (TOEs) list the required additional skill identifier (ASI) 5U (air operations officer) for G3/S3 Air positions, and the comparable enlisted ASI Q8 (tactical air operations) for noncommissioned officer (NCO) positions. Both officers and NCOs must complete the Battle Staff Course (BSC) or the Joint Firepower Control Course (JFCC) at the US Air Force (USAF) Air Ground Operations School (AGOS) to qualify for the ASI.

The BSC focuses on joint air ground operations at division and higher levels; JFCC, on brigade and below levels. A third AGOS course, the Joint Combat Airspace Command and Control (JCACC) Course, offers instruction in joint combat airspace command and control doctrine, techniques, and procedures at division and above. Completion of the BSC or JFCC is a prerequisite for attending JCACC. Currently, there is no ASI for completing JCACC.

The US Army Aviation Center (USAAVNC) has proposed a change to the AR 611-series regulations that would delete ASIs 5U and Q8, and add ASIs L7 (joint air ground operations), L8 (joint battle staff), and L9 (joint combat A2C2 staff). Prerequisites for awarding the new ASIs would be completion of the JFCC, BSC, and JCACC, respectively. The new ASIs would document officer, warrant officer, and NCO positions requiring A2C2 skills, and identify personnel who have received the training.

DISCUSSION: Causes of A2C2 performance deficiencies at various staff levels can be attributed, in part, to the incumbents' lack of training. Current coding of TOEs does not identify the requisite A2C2 skills and knowledge by command echelon. Consequently, total A2C2 training requirements cannot be documented, nor can previously trained personnel be identified.

Collective A2C2 tasks are identified in division and brigade mission training plans (MTPs). In 1988, the US Army Combined Arms Training Activity (CATA), in its proposed *A2C2 Training Program Implementation Plan*, identified individual A2C2 critical tasks. The Army Research Institute (ARI) study, *Air-Ground Training Feedback System*, will complete an analysis of airspace management tasks by the end of the first quarter, fiscal year (FY) 94. The ARI task analysis may identify new collective and individual A2C2 tasks. The CATA and ARI documents should form the basis for A2C2 critical task performance.

Once A2C2 critical tasks are updated, appropriate branch, functional, and professional development courses (including AGOS courses) should be reviewed to determine if they satisfy the current A2C2 performance requirements. AGOS courses that qualify personnel in the proposed ASIs should be so certified, based on the foregoing review.

RECOMMENDATIONS: Recommended solutions to A2C2 performance deficiencies attributable to lack of requisite skills and knowledge require documenting who must be trained in A2C2, identifying or verifying the A2C2 tasks to be trained, and determining where these A2C2 tasks will be trained. The solutions require the following actions:

- Establish proponency for proposed ASIs
- Code TOEs with new ASIs
- Update A2C2 individual tasks
- Review the content of affected branch, functional, and professional development courses; recommend requisite revisions, based on updated A2C2 tasks
- Certify AGOS courses for ASI qualification.

ACTIONS/AGENTS:

- Assume proponency for AR 611-series ASI changes: CAC,CD (Lead); CAC-T and USAAVNC (Assist)
- Code TOEs: CAC,CD (Lead); AHS, JFKSWC, USAADAS, USAARMC, USAAVNC, USACLMS, USAFAS, USAIC, and USAIC&FH (Assist)
- Update tasks: CAC-T (Lead); AHS, CGSC, JFKSWC, USAADAS, USAARMC, USAAVNC, USACLMS, USAFAS, USAIC, USAIC&FH, and USASMA (Assist)
- Review course content: CAC-T (Lead); AHS, CGSC, JFKSWC, USAADAS, USAARMC, USAAVNC, USAIC&FH, USAFAS, USAIC and USASMA (Assist)
- Certify AGOS courses: CAC.

RESOURCES: To be determined, based on approval of proposed ASIs and the extent of course revisions necessitated by the updated A2C2 individual tasks. Estimated time for revising individual tasks: 40 man-days. Estimated time for revising course and materials: 240 man-days.

MILESTONES:

- Assume proponency for proposed ASIs: Sep 93
- Code TOEs: first quarter, FY94
- Update tasks: second quarter, FY94
- Review course content: third quarter, FY94
- Certify AGOS courses: fourth quarter, FY94.

ISSUE: TRAINING - 2

TITLE: LACK OF ADEQUATE A2C2 PLAY IN ARMY EXERCISES **DATE:** 1 Sep 1993

NUMBER: T-2 and M-1

ECHELON(S): All

BATTLEFIELD FUNCTIONAL AREA(S): Maneuver, Fire Support, Air Defense, and Intelligence and Electronic Warfare

TIME FRAME(S): Near-term

ISSUE: Corps and divisions do not fully integrate A2C2 into their training exercises. Since current training simulations do not portray the full extent of staff A2C2 performance requirements and their effects, commanders are not forced to consider the implications of the lack of A2C2 staff performance.

BACKGROUND: A2C2 task performance requires coordination and interaction with staff and units. The difficulty and infrequent performance of A2C2 tasks means there is a greater need for sustainment training. Exercises provide the best opportunities for this sustainment training. Commanders select the specific type of training exercises based on the exercises' abilities to satisfy the unit's training objectives within available resources.

The Combat Training Center (CTC) program offers opportunities to exercise staff functions in realistic combat environments. The training focus of the National Training Center (NTC), Combat Maneuver Training Center (CMTC), and Joint Readiness Training Center (JRTC) is on the battalion task force while also exercising the brigade headquarters and its supporting units. The focus of the Battle Command Training Program (BCTP) is the corps and division battle staffs.

Proper use of simulations provides alternatives to the use of expensive field training for effective command and battle staff training. Simulations currently support CMTC, BCTP, and Blue Flag Exercise, as well as officer training in TRADOC schools. The current family of Army simulations that support leadership training includes three standard models: JANUS at company level; Brigade/Battalion Simulation (BBS) at brigade and battalion levels; and Corps Battle Simulation (CBS) at corps and division levels. Both CBS and BBS will be replaced by a second generation model, WARSIM 2000 (currently in the requirements definition phase of procurement).

DISCUSSION: The extent of A2C2 play in exercises depends on the commander's training objectives. (This lack of command emphasis, however, is addressed in issue T-4.) Even with command emphasis, exercising the full range of A2C2 actions and functions during field and live-fire exercises requires extensive resources. Consequently, these exercises rely upon training support in the form of simulations for effective, efficient A2C2 training and evaluation.

The training focus of NTC, CMTC, and JRTC exercises is not suitable for exercising the full extent of A2C2 coordination and integration functions such as those found at corps and division levels. In addition, scenarios for these field and live-fire exercises are developed based on the unit commander's training requirements, which may not include A2C2. When supported by simulations, the CMTC, BCTP, and Blue Flag battle staff exercises use scripted or manual work-arounds by controller personnel to train and evaluate A2C2 staff actions and functions. These work-arounds are only as effective as the controller staff that employs them.

None of the Army's current simulations model the full range of A2C2 requirements within their program logic. They do not

automatically impose realistic penalties for substandard A2C2 performance. The software limitations of existing simulation programs do not fully support the commander's ability to train A2C2 during exercises.

RECOMMENDATIONS: Recommended solutions to A2C2 exercise deficiencies requires both leader development and materiel actions. The former are addressed in issue T-4. Materiel solutions require the following actions:

- Identify A2C2 simulation requirements by command echelon. The current Mission Training Plans (MTPs) provide collective tasks for A2C2 elements at division and brigade. The Army Research Institute (ARI) study of close air support (CAS) at CTCs (see issue T-1) may provide additional collective training requirements. Manual A2C2 work-arounds that AGOS, BCTP, or other controller personnel use are the starting point for identifying the modifications necessary to existing models.
- Determine if manual work-arounds for existing simulations, as employed by control personnel trained in A2C2, are viable interim solutions to software program changes.
- Prepare A2C2 requirements for each of the existing Army standard simulations. These requirements will form the basis for engineering change proposals or software changes to update the simulations. There are a number of proposed software changes to these simulation programs, and A2C2 will have to compete with other requirements. The impact of the proposed software changes on the simulation program also must be considered. For example, current program additions have so slowed the processing speed of the BBS that there is an unrealistic delay in response time.
- Prepare A2C2 simulation requirements for WARSIM 2000 requirements definition documents (RDD) (e.g., mission needs statement [MNS]).

ACTIONS/AGENTS:

- Identify A2C2 simulation requirements: NSC (Lead); CAC,CD, CAC-T, JFKSWC, USAADAS, USAARMC, USAAVNC, USAFAS, USAIC, and USAIC&FH (Assist)
- Determine viability of manual work-arounds: NSC (Lead); CAC-T (Assist). If viable, --

    - Identify BCTP controller BSC and JCACC training requirements: CAC-T (Lead)
    - Program Battle Staff Course (BSC) and Joint Combat Airspace Command and Control Course (JCACC) training for appropriate BCTP team members: CAC-T (Lead)

- Prepare A2C2 requirements for existing simulations: NSC (Lead); CAC-T (Assist)
- Submit required engineering change proposals (ECPs) to US Army Materiel Command: NSC (Lead)
- Prepare A2C2 simulation requirements for WARSIM 2000 RDD: NSC (Lead); CAC-T (Assist).

RESOURCES: The extent of changes required in existing simulations software will determine the necessary resources. Air Ground Operations School (AGOS) training for selected BCTP controllers requires the programming of travel and temporary duty (TDY). A2C2 simulation requirements for WARSIM 2000 are incorporated into the total simulation procurement; they are not a separate item. Estimated time for preparing MNS: eight man-days. Estimated time for preparing RDD: 50 man-days.

MILESTONES:

- Identify A2C2 simulation requirements: fourth quarter, FY94
- Determine viability of manual work-arounds: first quarter, FY94

- Identify training requirements: first quarter, FY94
- Program BCTP team training: first quarter, FY94

- Prepare A2C2 simulation requirements (ECPs): first quarter, FY95
- Prepare A2C2 simulation requirements (RDD) for WARSIM 2000: Oct 93.

ISSUE: TRAINING - 3 AND LEADERSHIP - 1

TITLE: LACK OF A2C2 TRAINING EMPHASIS **DATE:** 1 Sep 1993

NUMBER: T-3 and L-1

ECHELON(S): All

BATTLEFIELD FUNCTIONAL AREA(S): Maneuver, Fire Support, Air Defense, and Intelligence and Electronic Warfare

TIME FRAME(S): Near-term

ISSUE: Most commanders do not place appropriate emphasis on A2C2. This lack of emphasis displays itself in lower priorities for staffing G3/S3 Air positions with qualified personnel, and in training individuals and units to perform A2C2 missions and functions.

BACKGROUND: Leader development training in A2C2 begins in some officer advanced courses (OACs) (e.g., air defense, artillery, and aviation). It is not fully integrated into the Combined Arms and Services Staff School (CAS3), however; and, only about one-third of the Command and General Staff Officer Course (CGSOC) students attend the Advanced Fires elective, which incorporates A2C2. There is no such elective in the Fort Leavenworth phase of the battalion and brigade Pre-Command Course (PCC). The extent of A2C2 training in military occupational specialty (MOS)-specific portions of advanced noncommissioned officer courses (ANCOCs) and senior warrant officer training (SWOT) courses is uncertain since there is no A2C2 instruction in their common core. The Battle Staff NCO course also lacks specific A2C2 training objectives. All of these professional development courses (PDCs) rely on follow-on functional training at the Air Force's Air Ground Operations School (AGOS) for A2C2 assignment-specific qualification.

The AGOS conducts a three-day Joint Senior Theater Battle Commanders Course for colonels and general officers. The course provides senior commanders and their staffs with an appreciation for the third dimension and the joint assets available or required to conduct command and control warfare (C2W) in a joint and combined environment. The course emphasizes the joint planning and integration required to destroy and disrupt enemy command and control (C2) (counter C2) and protect friendly C2 (C2 protect). The Army receives five spaces per course; however, Army general officer and Army colonel attendance has been infrequent.

Leader development for A2C2 must continue in the unit. Some officer and NCO A2C2 staff positions, however, are filled with personnel who are not trained to perform the necessary unit A2C2 coordination and integration functions. The unit often must send such incumbents TDY to attend A2C2 functional training at AGOS; some commanders are reluctant to commit funds for this training. Other units temporarily fill G3/S3 Air positions with officers who are awaiting subsequent reassignment.

Often the lack of A2C2 training emphasis continues in unit training. Field Manual (FM) 25-101, *Battle Focused Training*, details the development and execution of unit training programs, and identifies the planning and execution of A2C2 as a common problem at combat training centers (CTCs). The mission essential task list (METL), which commanders use to develop their training programs, is an unconstrained statement of tasks required to accomplish a unit's wartime missions. Commanders develop their METLs from external directives, war plans, and doctrinal and training publications such as the mission training plan (MTP). The next higher commander approves the METL. The division and brigade MTPs contain A2C2 collective tasks. The battalion task force MTP addresses A2C2 subtasks as part of other combat operations tasks. Ultimately, it is the commander who determines which METL tasks

their unit, and their subordinate units, can execute and will train.

DISCUSSION: Among the training priorities for leaders are: train all elements to be proficient on their mission essential tasks; assume personal involvement in planning, executing, and assessing training; and develop subordinates. Leaders must allocate resources toward achieving and sustaining proficiency in critical A2C2 tasks. If resources are constrained, leaders must make conscious decisions to delete lower-priority training requirements. Senior leaders cannot make informed decisions among these competing requirements unless they understand the relative importance of A2C2 and can assess their unit's proficiency in performing A2C2 functions.

Personnel Command (PERSCOM) determines an officer's next assignment by the tenth week of the 20-week OAC. If the assignment requires A2C2 training (see issue T-1), the officer can be sent to AGOS on temporary duty (TDY) en route. Similar training en route procedures can be employed for CGSOC graduates.

Directed or mandated A2C2 training in the common core of all officer courses, SWOT courses, and ANCOCs competes with branch-specific training objectives. However, lack of A2C2 training emphasis may be attributable to the absence of A2C2 training objectives in selected PDCs. An A2C2 training program for PDCs was proposed in 1988, and portions may still be applicable, once updated (see issue T-1). These revisions may require insertion of A2C2 training objectives (based on the target population) into appropriate leader development courses.

Commanders must be aware of the importance of A2C2 individual and unit training, the means available to them for training and assessing A2C2 performance, and the value of participation in such training exercises as the Air Force's Blue Flag, which offers

training for corps and division staffs (see issue T-2). Senior officers in selected command and staff positions also should be encouraged to attend the Senior Theater Battle Commanders Course.

Commanders also must have the requisite training support for A2C2. In addition to enhancing training simulations (see issue T-2), programmed cyclic reviews of training literature must ensure that MTPs reflect current A2C2 performance requirements. This review and revision is imperative because of the promulgation of new force projection Army and A2C2 doctrine, and the introduction of Army Tactical Missile System (ATACMS) and unmanned aerial vehicles (UAVs) onto the battlefield.

RECOMMENDATIONS:

- Review appropriate PDCs for adequacy of A2C2 performance objectives (see issue T-1). Based on this assessment, recommend proponent school revisions to ANCOCs, Battle Staff NCO Course, SWOT courses, OAC, CAS3, CGSOC advanced tactics phase, PCC, Army Warfighter Course, Tactical Commanders Development Course (brigade and battalion), and Division Commanders/Assistant Division Commanders Course.
- Require that combat arms CGSOC students attend a revised Advanced Fires elective that includes A2C2 training objectives.
- Require that PCC combined arms commanders attend the Tactical Commanders Development Course or Army Warfighter Course, which include A2C2 training objectives.
- Stress the importance of A2C2 and its MTP tasks in the current PCC (until course revision is complete) and the Division Commanders/Assistant Division Commanders Course.
- Continue to stress the importance of A2C2 in the CTC program and participation in joint exercises. The CTCs and exercises provide a valuable means for commanders to evaluate their unit's proficiency in performing A2C2 tasks.

- In coordination with PERSCOM (TAPC-OPE-E) and Department of the Army (DAMO-FDI), identify the types of positions that benefit from completing the Senior Theater Battle Commanders Course, and encourage senior officer attendance, accordingly.
- Ensure that proponent schools accomplish cyclic reviews and revisions of the MTP, based on revised A2C2 doctrinal tactics, techniques, and procedures publications.

ACTIONS/AGENT:

- Review PDCs: CGSC (Lead); USASMA (Assist)
- Recommend revisions to identified PDCs: CGSC (Lead); USASMA (Assist)
- Direct attendance at the revised CGSOC Advanced Fires elective and the revised Pre-Command/Tactical Commanders Development/Army Warfighter courses: CGSC (Lead)
- Stress the importance of A2C2 in the current PCC and Division Commanders/Assistant Division Commanders Course: CGSC (Lead)
- Stress the importance of A2C2 in the CTC program: CAC-T (Lead)
- Encourage senior officer attendance at the Senior Theater Battle Commanders Course: CGSC (Lead); HQDA and PERSCOM (Assist)
- Ensure proponent review and revision of MTPs: CAC-T (Lead).

RESOURCES: To be determined, based on the extent of needed revisions to the identified PDCs. Estimated time for proponent review of courses: eight man-days. Estimated time for course redesign and materials revision: 40 man-days.

MILESTONES:

- Direct CGSOC Advanced Fires attendance: Sep 93 and ongoing
- Stress the importance of A2C2 in the current PCC, Division Commanders/Assistant Division Commanders Course, and CTC program: Sep 93 and ongoing
- Encourage attendance at the Senior Theater battle Commanders Course: Sep 93 and ongoing
- Ensure proponent review and revision of MTPs: Sep 93 and ongoing
- Review course content of designated PDCs: third quarter, FY94
- Recommend course revisions: fourth quarter, FY94
- Proponent schools implement revised A2C2 training in PDCs: FY95 (may be accelerated if revisions are completed earlier)
- Direct attendance at Pre-Command/Tactical Commanders Development/Army Warfighter courses (revised to include A2C2 training objectives): FY95 (may be accelerated if revisions are completed earlier).

ISSUE: ORGANIZATION - 1

TITLE: LACK OF ADEQUATE A2C2 PERSONNEL IN CORPS AND DIVISION TOEs **DATE:** 1 Sep 1993

NUMBER: O-1

ECHELON(S): Echelons corps and below (ECB)

BATTLEFIELD FUNCTIONAL AREA(S): Maneuver, Fire Support, Air Defense, and Intelligence and Electronic Warfare

TIME FRAME(S): Near-term, midterm

ISSUE: There is an inadequate number of A2C2-qualified personnel at corps and division levels. Specific problems arise from: low fill-high turnover rates; lack of qualified corps liaison officers (LNOs) assigned to the battlefield coordination element (BCE); and no aviation LNOs assigned below corps.

BACKGROUND: The BCE chief and A2C2 personnel that the analysts interviewed indicate problems resulting from the absence of corps LNOs to the BCE, and the number (one officer, one noncommissioned officer [NCO]) of personnel assigned to accomplish the BCE A2C2 functions around-the-clock. Division and Aviation Brigade elements echoed this staffing concern as well. The inability of the personnel assignment system to manage assignments by additional skill identifier (ASI) codes often results in unqualified personnel being assigned A2C2 responsibilities. The perception that ALO, and G3 and S3 Air positions are less than "fast track" slots also results in high turnover and few repeat assignments.

DISCUSSION: A US corps is required to send liaison to the BCE located at the operations center of the joint force air component commander (JFACC). By design criteria in 1990, the corps is authorized three liaison teams to meet the need to send liaison personnel to the higher echelon and to the flank units. Should

more liaison teams be required, augmentation TOEs are documented to provide additional liaison capability.

The BCE capability to represent and coordinate the joint force land component commander's (JFLCC's) intentions at the JFACC operations center depends upon input and coordination from the corps. Therefore, the corps liaison team to the BCE is essential. A lack of liaison capability at corps levels during Operation Desert Storm, however, forced the activation of the 29th Air Traffic Service (ATS) Group, Maryland National Guard. Personnel from this unit filled gaps in the A2C2 system at corps and above.

In 1990, a US Army War College study project, *Adequacy of Army Airspace Command and Control*, reported field survey results concerning A2C2 resources. This study concluded that resources of the A2C2 elements at division and corps levels were inadequate to perform around-the-clock operations. A second area of concern identified by the study, and confirmed during this action plan effort, is the lack of sufficient numbers of LNOs to serve with supported units. The study revealed that 10 of the 13 responding divisions and two of the five corps had no aviation LNOs assigned. In contrast, there were no instances of unfilled fire support officer (FSO) or air defense artillery (ADA) LNO positions. The study further identified turbulence in the individual positions of the A2C2 cell as a problem.

Interviews with staff officers at the 24th Infantry Division (24ID) and XVIII Airborne Corps echoed the results documented in the study. As an example, the 24ID's aviation brigade is required to dispatch LNOs to the three division tactical operation centers (TOCs) and all maneuver brigades; the total requirement is for 12-14 LNOs to support 24-hour per day operations. The unit is authorized two LNOs.

RECOMMENDATIONS:

- LNO augmentation with A2C2 qualifications should be added to the corps headquarters and headquarters company (HHC) to supply LNOs to the BCE
- TOEs documenting A2C2 cells at corps and division should be adjusted to recognize full time requirements for A2C2 staffing
- Personnel assigned to A2C2 slots should be stabilized in the position for a reasonable time
- The procedures that air defense and field artillery use to document and fill LNO positions should be applied to A2C2 requirements.

RESOURCES:

- Additions to corps TOE required to support LNO requirements at BCE
- LNO augmentation for BCE to corps
- Additions to TOEs to support LNO requirements at corps and division
- Additions to aviation brigade TOEs to support requirements at corps and division.

ACTIONS/AGENTS:

- Add augmentation to the corps headquarters TOE to support the A2C2 LNO to BCE: CAC,CD (ORGD)
- Adjust TOEs at corps and division to reflect A2C2 and LNO requirements: CAC,CD
- Obtain a memorandum of understanding (MOU) between Department of Army (DA), major commands (MACOMS), and CAC that addresses the qualifications of, and stabilization policy for, A2C2 and aviation liaison personnel: CAC,CD (Lead); USAAVNC, ATCA (Assist)
- Review ADA/FA LNO assignment practices: CAC,CD.

MILESTONES:

- Review assignment practices: Dec 93
- Add augmentation to corps TOE: Dec 93
- Adjust HHC TOE below corps to reflect A2C2 and aviation LNO requirements: second quarter, FY94
- Obtain MOU: fourth quarter, FY94.

ISSUE: ORGANIZATION - 2

TITLE: LACK OF ADEQUATE BATTLEFIELD COORDINATION ELEMENT (BCE) STAFFING **DATE:** 1 Sep 1993

NUMBER: O-2

ECHELON(S): Echelons above corps (EAC)

BATTLEFIELD FUNCTIONAL AREA(S): All

TIME FRAME(S): Near-term

ISSUE: There is inadequate staff in the battlefield coordination element (BCE) airspace management section in terms of numbers and qualifications to conduct continuous operations in a joint environment across the operational continuum.

BACKGROUND: At the land component commander (LCC) level within the theater, airspace coordination, integration, and synchronization actions of the Army are the responsibility of the Army force (ARFOR) headquarters G3 staff element. The BCE is provided by the ARFOR G3 to expedite the exchange of information with elements of the joint force air component commander (JFACC). The BCE normally collocates with the JFACC operations center to achieve efficiency through face-to-face coordination with counterparts within the theater air control system/Army air ground system (TACS/AAGS). If the Navy is designated the JFACC, the BCE can operate afloat with the Naval tactical air coordination center (TACC). The BCE's basic functions include processing ARFOR requests for tactical air support and synchronizing air support for Army operations, monitoring and interpreting the land battle situation for the JFACC operations center, providing an interface for the exchange of current intelligence and operational data, and coordinating air defense and airspace control matters.

The airspace management division of the BCE has two sections: air defense artillery (ADA) and army airspace command and control (A2C2). Two ADA officers, one airspace management officer, and two ADA and one aviation operations noncommissioned officer (NCO) staff the airspace management division.

When the US Air Force is designated the JFACC, the ADA section is collocated with the defensive air section of the air operations center (AOC). It ensures full integration of Army and Air Force air defense procedures and capabilities. The A2C2 section is collocated with the airspace management section of the AOC. It coordinates, integrates, and assists in the regulation of the use of airspace, defined airspace dimensions, and identification procedures for all airspace users. In accordance with the 1st Battlefield Coordination Detachment standing operating procedure (SOP), the A2C2 section performs four basic tasks: air defense (AD) coordination, combat airspace deconfliction, combat operations control, and fire coordination. Activities using airspace that must be supported by the A2C2 section include: fire support, unmanned aerial vehicles (UAVs), ADA operations, Army aviation operations (including combat and combat support aircraft), special electronic mission aircraft (SEMA) operations, medical aircraft operations responsibilities, and joint and combined operations.

DISCUSSION: Airspace management responsibilities of the BCE A2C2 section necessitate coordination with both plans and operations personnel within the AOC on a continuous basis. The functions of the A2C2 section are:

1. Coordinate Army airspace use requirements with the AOC operations and plans division or Naval TACC afloat, if appropriate.
2. Coordinate joint force requirements for use of Army airspace with the appropriate land component A2C2 element.

3. Integrate Army airspace user activities with the AOC airspace plans.
4. Advise the chiefs of the AOC and BCE of significant activities that affect the joint use of airspace.
5. Advise the airspace control authority (ACA) and the BCE chief on the effect that joint airspace control measures or restrictions have on the conduct of the ground battle.
6. Represent the ground force interests in the development and approval of airspace control measures and restrictions.
7. Receive, for staffing and approval, all Army requests for airspace control measures and restrictions.
8. Provide timely and complete distribution of the airspace control order (ACO) to all ARFOR staff elements that need it.
9. Monitor the integration of Army air traffic service (ATS) facilities into the AOC's airspace control system.
10. Provide the ACA with the location and status of Army airfields, navigational aids, ATS facilities, and A2C2 control measures.
11. When intelligence and electronic warfare systems operations are requested, coordinate with AOC airspace management to obtain airspace and ensure SEMA and UAV missions are scheduled into the daily ATO. Coordinate changes in mission requirements through AOC airspace management operations.
12. When operational support airlift (OSA) is requested, coordinate with AOC airspace management to obtain airspace and ensure OSA missions are scheduled into the daily ATO. Coordinate changes in mission requirements through AOC airspace management operations.
13. Monitor the integration of the ground commander's A2C2 procedures into the AOC's airspace control system.

The size of the A2C2 section staff, extent of airspace management responsibilities, and lack of automated information management support currently preclude around-the-clock operations of the BCE's A2C2 section. The absence of technically qualified and experienced SEMA and UAV personnel in the A2C2 section hamper coordination and deconfliction of these airspace users.

This issue specifically addresses capabilities of the BCE. A review of the ARFOR A2C2 capabilities is also warranted. Indications suggest current ARFOR staffing may be a contributing factor in establishing the workload directed to the BCE airspace management section.

RECOMMENDATIONS: To enable the BCE to sustain 24-hour operations, add the following positions to the BCE table of organization and equipment (TOE):

- One SEMA aviation officer (specialty 15C35)
- Change the current aviation operations NCO position to an air traffic control (ATC) NCO position (military occupational specialty [MOS] 93C40). Increase requirements to a total of three NCOs.
- One communications NCO (MOS 31Y30).

ACTIONS/AGENTS:

- Revise BCE TOE: CAC,CD (ORGD)
- Review ARFOR staff A2C2 capabilities: CAC,CD.

RESOURCES:

- Revise BCE TOE: estimated ten man-days
- Review ARFOR staff A2C2 capabilities: estimated 20 man-days.

MILESTONES:

- Revise BCE TOE: Dec 93
- Review ARFOR staff A2C2 capabilities: Dec 93.

ISSUE: ORGANIZATION - 3

TITLE: LACK OF FORMAL A2C2 ELEMENT AT BRIGADE AND BELOW **DATE:** 1 Sep 1993

NUMBER: O-3

ECHELON(S): Brigade and below

BATTLEFIELD FUNCTIONAL AREA(S): Maneuver

TIME FRAME(S): Near-term

ISSUE: There is no formal A2C2 organizational element at brigade and below to support the commander's use of the third dimension of battle space.

BACKGROUND: Below the division level, planning and execution of A2C2 functions is the responsibility of the maneuver brigade/ battalion commander. While there is no formal planning cell at these levels, the maneuver commander must provide his A2C2 requirements to the division for coordination and approval. At the division level, the G3 Air staff in the fire support (FS) cell of the division main command post (CP) perform the planning functions.

DISCUSSION: The ground or aviation maneuver commander must coordinate all procedural controls through the division FS cell, A2C2 section, to the corps A2C2 section at the main fire support coordination (FSCOORD) cell. Coordination and deconfliction are required at the lowest level capable of coordinating the use of the airspace. While the air traffic service (ATS) and aviation liaison officers (LNOs) in the division FS cell support the division commander's responsibility to establish and maintain the A2C2 system, maneuver and aviation brigade commanders planning responsibilities are not supported.

Ground maneuver brigade commanders are responsible for --

- Coordinating with division concerning airspace users operating from the brigade rear boundary to the fire support coordination line (FSCL)
- Requesting airspace control measures and effecting target hand-over to supporting aviation
- Establishing transition routes to firing positions that provide minimal conflict with indirect fire weapons and air defense artillery (ADA) weapons.

The aviation brigade commander is required to --

- Provide LNO to the division A2C2 cell
- Establish flight plan requirements
- In coordination with the G3 Air, establish procedures to integrate all Army aircraft entering or leaving the division area of operations
- Recommend navigational aid and airfield locations
- Establish the division air traffic regulation system
- Deploy brigade assets as part of the combined arms team.

The absence of a dedicated planning cell impedes the maneuver commander's ability to coordinate use of the disputed segment of the airspace. The A2C2 planning and coordination requirements of the brigade warrant the establishment and documentation of an A2C2 cell at this echelon to coordinate and deconflict the airspace over the maneuver brigade and battalion up to the coordinating altitude. The conduct of A2C2 functions by the brigade cell should include responsibility for battalions assigned to the brigade, and should be coordinated with the battalion S3 Air.

RECOMMENDATIONS:

- Review and revise the Army A2C2 concept to identify the maneuver brigade/battalion commander's requirements and responsibilities for airspace control directly above the close battle area up to the coordination altitude. (See issue D-1.)
- Identify A2C2 responsibilities and functions at maneuver brigade and below. Appropriate staffing will ensure the required execution of planning, integration, and coordination of airspace.
- Incorporate clear functional descriptions (who, what, when, how) of these requirements into field manuals (FMs) for brigade and below.
- Authorize equipment necessary to support the A2C2 functions on the affected tables of organization and equipment (TOEs).
- Integrate A2C2 requirements for planned automated capabilities in the concept for battalion and below command and control (B2C2).

ACTIONS/AGENTS:

- A2C2 concept: see issue D-1
- A2C2 functional review: CAC,CD (Lead); battlefield functional area (BFA) proponents (Assist)
- FM revisions: BFA proponents
- TOE revisions: CAC,CD (Lead); BFA proponents (Assist)
- B2C2 operational concept integration: CAC,CD (Lead); maneuver BFA proponents (Assist).

RESOURCES:

- A2C2 concept revision: see issue D-1
- A2C2 functional review: to be determined
- FM revisions: as programmed for cyclic review and revision

- TOE revisions: establish standard A2C2 cell, apply to data base electronically (estimated 40 man-days)
- B2C2/A2C2 integration review: incorporated into resources programmed for B2C2 concept development.

MILESTONES:

- A2C2 concept: Nov 93
- A2C2 functional review: Jul 94
- FM revisions: next proponent update; revised FM 100-103 by fourth quarter, FY95
- Update TOEs: proponent changes by Jan 95
- Review B2C2 and integrate A2C2: in conjunction with milestones established for B2C2 concept development.

ISSUE: MATERIEL - 1

TITLE: LACK OF ADEQUATE A2C2 PLAY IN ARMY EXERCISES **DATE:** 1 Sep 1993

NUMBER: T-2 and M-1

ECHELON(S): All

BATTLEFIELD FUNCTIONAL AREA(S): Maneuver, Fire Support, Air Defense, and Intelligence and Electronic Warfare

TIME FRAME(S): Near-term

ISSUE: (See Issue T-2)

ISSUE: MATERIEL - 2

TITLE: LACK OF A2C2 COMMUNICATIONS/ AUTOMATION CAPABILITIES **DATE:** 1 Sep 1993

NUMBER: M-2 (D-1 and M-5)

ECHELON(S): All

BATTLEFIELD FUNCTIONAL AREA(S): Maneuver, Fire Support, Air Defense, Intelligence and Electronic Warfare, and Combat Service Support

TIME FRAME(S): Midterm

ISSUE: There is a lack of effective communications and automation capabilities to support A2C2 requirements for systems integration (horizontal and vertical) at all echelons to achieve intra-Army and interservice connectivity.

- A2C2 automation equipment has deficiencies (i.e., equipment capability, connectivity, transportability).
- Army units lack automated interfaces with USAF's contingency theater air control system (TACS) automated planning system (CTAPS) and the USN's joint maritime command information system (JMCIS) of the joint force air component commander (JFACC).

BACKGROUND: Significant among the numerous lessons learned from Operations Desert Shield and Desert Storm (ODSS) are those associated with the lack of Army capabilities to effectively communicate and distribute information essential to the conduct of operations. These deficiencies had an adverse effect on operations at all echelons within the Army, as well as on the Army's connectivity with the other services. Lack of organic communications in the battlefield coordination element (BCE) adversely affected the communications architecture at echelons

above corps (EAC). The inadequacies of BCE communication links with Army forces compounded the problem. At echelons corps and below (ECB), existing communications capabilities were often unable to maintain contact with either air or ground vehicles employed in a deep operation. The most visible ODSS example of the information distribution deficiency of A2C2 was the Army's inability to electronically access the air tasking order (ATO) and other related messages. The JFACC used the ATO, special instructions (SPINS), and airspace control order (ACO) to disseminate joint airspace information. A2C2 organizations could not electronically access the information because they lacked the automation needed to interface with the Air Force's computer-based distribution system. From EAC down to forward deployed units, the Army's automated systems did not interface. The Army, therefore, did not have immediate access to vital mission data and other A2C2 operational information that should have been available on a real-time or near-real-time basis. To overcome this deficiency in ODSS, the A2C2 elements implemented many field expedient methods; some of those are continued in the currently existing A2C2 system in the field.

DISCUSSION: The criticality of communications and automation systems to the Army in the force projection Army command and control (FORCPAC2) concept is paramount. This level of importance is due to the sophistication of weapons systems, expanse of likely battlefields, distances separating forces, and the speed at which operational and tactical decisions must be made within a theater of operations. Information must be acquired, transferred, manipulated and refined, presented, acted on, and dispatched to those conducting combat operations. The information must travel rapidly, without interruption; in most situations, it must go to many receivers simultaneously. These criteria particularly will apply to the communications and automation requirements of A2C2 in its role in support of FORCPAC2.

The Army's capabilities currently available to overcome the deficiencies in communications and automation are embodied in the Army Command and Control System (ACCS). Within the theater of operations, there are existing capabilities at EAC and ECB for support of A2C2 requirements for more effective communications and information distribution within the system. In addition, there are enhancements to the existing systems, in either concept or materiel development phases, that will offer even greater improvements to the support of A2C2. At the EAC level of the ACCS, the Standard Theater Army Command and Control System (STACCS) is evolving to its objective capability to support command and control (C2) at that echelon. STACCS will primarily support the theater army commander, his staff, and major subordinate commands, by receiving, processing, and transmitting (distributing) C2 information critical to the decision-making processes. It will provide the capability to establish automated interfaces that will allow the exchange of C2 information with headquarters and other elements of higher, subordinate, other service, and allied commands. The STACCS will utilize the Defense Data Network (DDN) technology for connectivity to other theater-level units.

At the ECB level of the ACCS, the Army Tactical Command and Control System (ATCCS) is the basic automation and communications architecture being developed to support the ever-greater demands for information envisioned in the FORCPAC2 concept. The ATCCS architecture integrates the modernization of automated C2 systems to support the battlefield functional areas (BFAs) of air and ground maneuver, air defense, fire support, intelligence and electronic warfare, and combat service support. The ATCCS architectural concept specifies commonalities for the BFA systems in terms of languages, protocols, formats, and interfaces, as well as providing horizontal and vertical connectivity among them. The communications component of ATCCS includes functionally oriented systems designated as combat net radio (CNR), area common user system (ACUS), and the army data distribution system (ADDS). All

are designed to support the ATCCS architecture in accomplishing rapid voice and data transmission on the battlefield.

Current efforts by the Army to improve the A2C2 system have included, to some degree, the application of ACCS capabilities to the problem. At EAC, the Army has decided to enhance the Army Central Command's (ARCENT's) conduct of deep operations activities by using a STACCS workstation to support the targeting process in the deep operations cell of the theater army headquarters, in the military intelligence (MI) brigade, and in the BCE. This introduction of STACCS into the BCE represents the first use of a standard Army automation system in this key element of the A2C2 organizational structure. At ECB, the ATCCS architecture includes the employment of the maneuver control system (MCS) devices at corps, division, brigade, and battalion for receiving, processing, displaying, and transmitting (distributing) C2 information to support the requirements of the maneuver BFA. At these echelons, MCS devices are located in A2C2 elements and related staff sections to support the conduct, coordination, and integration of the airspace control functions. Their availability and current capabilities provide a basis for further enhancements to enable MCS to more effectively support the A2C2 system.

This critical, deficiency-based issue centers around the lack of an automated interface between computer systems supporting the Army forces of the land component commander and the computer systems supporting the JFACC. The criticality of the issue, and the interface, is based on the generation of the ATO, ACO, and related messages by the JFACC's system and, as previously described, the lack of an Army system capability to acquire it electronically. CTAPS is being developed for use in the USAF air operations center (AOC) at the theater level and in the air support operations center (ASOC) at the corps level. JMCIS is being developed by the Navy for its tactical air control center (TACC). The counterpart Army systems are STACCS at the theater level and

MCS at ECB. The Army systems under development can provide the needed capabilities to effect the electronic interface. Based on the operational need evolving from the ODSS experience, definition of the Army-Air Force interfaces requirement is presently in progress. A user interface requirement (UIR) that documents the MCS-CTAPS interface has been completed and agreed to by both the Air Force and the Army. A UIR for STACCS-CTAPS is in the final staffing stage in the Army after being signed by the Air Force. These UIRs will serve as a basis for further development of the interface design concept and its implementation between the two services. To date, a similar requirement for interfacing STACCS or MCS with JMCIS has not been developed.

Key information architectural requirements remain to be further defined to support the implementation of the most effective, and efficient, interface between the Air Force and Army systems. The Army architecture must identify how STACCS or MCS, or both, will interface with CTAPS. To enhance the A2C2 system effectiveness to the greatest degree, the architecture selected must be the one that best supports the vertical and horizontal distribution of the A2C2 information (ATO, ACO, SPINS, etc.) to all elements at all echelons, and enables the Army to be responsive to that information in its conduct of the airspace control functions.

RECOMMENDATIONS:

- That primary command emphasis be placed on expediting further development and implementation of the Army-Air Force automated interfaces to achieve a high level of efficiency in distributing and interpreting information to support the functions of the A2C2 system.
- That all A2C2 system automation and communications equipment (capability including graphics, connectivity, transportability, etc.) be improved to achieve this objective. From a materiel aspect, achieving this objective will provide

an A2C2 system that will be fully capable of exploiting the near-real-time availability of the ATO, ACO, Army C2, and joint and combined control measures for more effective coordination, integration, and regulation of combat airspace, and for identification of airspace users.

- That UIRs documenting the STACCS/MCS-CTAPS interface(s) must include the exchange of information included in the ACO as well as data to support graphic displays and hard copy output.
- That operational requirements for interfacing STACCS/MCS and JMCIS be analyzed as a basis for further development and implementation of Army-Navy interfaces.

ACTIONS/AGENTS:

- STACCS/MCS-CTAPS Interface(s): CAC,CD (Lead); USASIGCEN, PM-OPTADS (Assist)
- A2C2 automation and communications equipment improvements: PM-OPTADS (Lead); CECOM, CAC,CD, USASIGCEN (Assist)
- STACCS/MCS-JMCIS interface(s): CAC,CD (Lead); USASIGCEN, PM-OPTADS (Assist).

RESOURCES:

- Funding is required to complete development of interfaces in terms of requirements, design specifications, and implementation (testing, fielding).
- Funding that is currently identified for A2C2 automation and communications equipment must be reviewed for higher prioritization.

MILESTONES:

- STACCS/MCS-CTAPS interface(s):
  - Requirements: FY93

- Design: FY94
- Implementation: FY95.

- A2C2 automation/communications equipment improvements:

  - Review/prioritization: FY94
  - Procurement: FY94-96 (in accordance with prioritization).

- STACCS/MCS-JMCIS interface(s): to be determined.

ISSUE: MATERIEL - 3

TITLE: LACK OF ATCCS SUPPORT OF A2C2 REQUIREMENTS **DATE:** 1 Sep 1993

NUMBER: M-3

ECHELON(S): Echelons of corps and below (ECB)

BATTLEFIELD FUNCTIONAL AREA(S): Maneuver, Fire Support, Air Defense, Intelligence and Electronic Warfare, and Combat Service Support

TIME FRAME(S): Midterm

ISSUE: There is a lack of full utilization of the Army tactical command and control system (ATCCS) architecture to support A2C2 requirements. Current ATCCS architecture does not identify A2C2 requirements (e.g., automation of information distribution, coordination of joint operations, deconfliction, and integration with the ground commander's operations and maneuver).

BACKGROUND: The lessons learned during operations Desert Shield and Desert Storm (ODSS) confirm the criticality of the need for improved Army capabilities to distribute A2C2 information. In doing so, the ODSS experience also strongly supports the importance of applying the advantages of automation to the problem. At ECB, the ATCCS represents the Army's automation capabilities. Although employed to some degree, and with some success, in ODSS, ATCCS made no significant contribution in support of A2C2 requirements for information distribution and communications. The major reason stated for this deficiency was that the ATCCS architecture did not provide the battlefield functional area (BFA) airspace users with a real-time information link with the system that was providing information on airspace control measures, mission changes, mission reports, and deconfliction. In terms of systems, ATCCS did not have an automated interface with the US Air Force's computer-

assisted force management system (CAFMS) (predecessor of contingency theater air control system [TACS] automated planning system [CTAPS]) in the air operations center (AOC) and Air Support Operation Center (ASOC) of the joint force air component commander (JFACC), the source of the theater air control system information for the theater of operations.

DISCUSSION: In the basic system architecture of the ATCCS, the maneuver control system (MCS) provides automation support for the maneuver BFA as well as information for the force-level information (FLI) system. Thus, MCS is the force-level commander's information system, consisting basically of the command data base, a common picture of the battlefield, and the commander's situation report. In addition, MCS is the maneuver BFA control system that is designed to interface with the control systems of the fire support, air defense, intelligence and electronic warfare, and combat service support BFA's. The role of MCS in the ATCCS architecture is to support the force commanders and their staffs as the primary tool for correlating, filtering, processing, extracting, formatting, and distributing information for the force. The MCS operational data base design is intended to enable it to accomplish these functions. One of the partitions of that data base is identified as "A2C2." Information to be incorporated in that partition includes the messages required to enable the A2C2 system to support the force-level commander.

There is a direct correlation between fully utilizing the ATCCS architecture to support A2C2 requirements and raising the level of effectiveness and efficiency of the A2C2 system. The automation and communication capabilities inherent in the ATCCS are critically needed to provide information related to the accomplishment of A2C2 functions, coordination of joint operations, and full integration with the force-level commander's operations, including maneuver, fire support, air defense, intelligence and electronic warfare, and combat service support.

Two major factors are currently influencing the use of the ATCCS architecture to support A2C2 requirements -- the impact of the FORCPAC2 concept and the lack of progress in MCS software development. Both of these factors affect the progress that is needed to ensure full ATCCS utilization as one of the solutions to the A2C2 system deficiencies.

The FORCPAC2 concept envisions ATCCS as a smaller but more capable system-of-systems. As a result, although this may reduce the number of items of automation equipment, those employed will feature enhancements to the hardware, software, and supporting communications that will ensure the matured system is fully capable of supporting FORCPAC2. A critical feature that must be ensured is the capability to interoperate internally among those systems within the ATCCS architecture, as well as externally with Army operational systems, joint systems, and allied systems.

Recent developments that have impeded the progress of MCS software development have delayed the availability of the A2C2 data base files. Lack of this important element of the expanded data base for MCS prevents the full utilization of MCS -- and the ATCCS architecture -- to effectively support A2C2 requirements. In addition, lack of other important files planned for the expanded data base, and other force-level enhancements (e.g., electronic map) also adversely impact on the capabilities required to improve the A2C2 systems. With the increasing sophistication of the use of information in FORCPAC2, there is a very critical need to fully utilize the ATCCS architecture capabilities to support the A2C2 requirements.

RECOMMENDATIONS:

- That the significance of the value of fully using the ATCCS architecture to increase efficiency and effectiveness of the A2C2 systems be recognized as the solution to the major deficiency in A2C2 -- lack of a capability to receive, process, and distribute the air tasking order (ATO), airspace control order (ACO), and other related messages to the airspace users at ECB.
- That the Army give high priority to achieving the objective of full utilization of ATCCS to support the employment of A2C2 systems in accordance with the FORCPAC2 concept.
- Specific actions recommended are:

  - In the further development of MCS software, top priority be assigned to those enhancements that will directly contribute to the support of A2C2 requirements.
  - The current and projected technical capabilities of the other BFA systems in the ATCCS architecture be examined for possible application in support of the A2C2 functions and more effective integration of A2C2 into the conduct of combat operations.

ACTIONS/AGENTS:

- MCS software development prioritization: CAC,CD (Lead); PM-OPTADS (Assist)
- ATCCS architecture A2C2 applications: CAC,CD (Lead); USAFAS, USAADAS, USAIC&FH (Assist).

RESOURCES:

- Programmed funding for MCS software development
- Required funding to determine feasibility of incorporating A2C2 applications in other BFA systems.

MILESTONES:

- Complete MCS software development
  - A2C2 data base file: FY95
  - Other A2C2 enhancements: FY96.
- Complete A2C2 applications for other BFA systems
  - Feasibility study: FY94
  - Software development: FY95-96.

ISSUE: MATERIEL - 4

TITLE: LACK OF COMMUNICATIONS AND AUTOMATION CAPABILITY IN THE BATTLEFIELD COORDINATION ELEMENT (BCE) **DATE:** 1 Sep 1993

NUMBER: M-4

ECHELON(S): Echelons above corps

BATTLEFIELD FUNCTIONAL AREA(S): Maneuver, Fire Support, Air Defense, and Intelligence and Electronic Warfare Support

TIME FRAME: Midterm

ISSUE: There is a lack of communications/automation capabilities in the battlefield coordination element (BCE). These are critical to the support of the interface between the joint force land component commander (JFLCC) and the joint force air component commander (JFACC).

BACKGROUND: The JFACC's responsibilities will be assigned by the joint force commander (JFC). Normally, these responsibilities would include, but not be limited to, planning, coordination, allocation, and tasking based on the JFC's apportionment decision. When the JFACC mission is assigned to the theater air force (AFFOR), the AFFOR uses a theater air control system (TACS) to support this mission. The TACS provides the JFACC with the organization, personnel, and equipment necessary to control theater air operations; to execute area air defense and area airspace management in the area of operations; and to coordinate those operations with components of other services.

The Army force (ARFOR) commander interfaces with the JFACC by employing the Army BCE, a subordinate detachment of the ARFOR G3. The BCE collocates with the AFFOR air operations center (AOC), or a US Navy tactical air coordination center (TACC) afloat in

operations when the JFC designates the Navy as the JFACC, and plays a vital role in coordination of the air and land aspects of the battle. It monitors and interprets the land battle situation for the AOC, provides the timely exchange of operational information during development and execution cycle for the air tasking order (ATO) and airspace control order (ACO), and coordinates the efforts to meet the land forces' needs for tactical support.

DISCUSSION: The Army Command and Control System (ACCS) concept addresses the need for integrated, interoperable, automated systems to support the commanders and staffs operating at the theater level. The concept provides for a command and control information system to enhance the quality and shorten the decision cycle of those commanders and staffs. The Standard Theater Army Command and Control System (STACCS) will reduce the time they need to acquire, retrieve, analyze, prepare, and disseminate data.

The contingency theater air control system (TACS) automated planning system (CTAPS) is the Air Force umbrella program to modernize elements of the Air Force TACS, specifically the AOC, air support operations center (ASOC), and wing operations center (WOC). The AOC is the senior control center of the TACS in a theater, and is responsible for planning, directing, and controlling the theater air effort in support of maneuver land forces. It prepares, issues, and monitors the execution of coordinated orders for the employment of all theater air forces (TAF). The CTAPS is based on the current capabilities of the computer assisted force management system (CAFMS), which provides automated support for the AOC in planning, constructing and reviewing of the ATO, generating mission schedules, carrying out operations, and monitoring resources. When the Navy acts as the JFACC, the joint maritime command information system (JMCIS) is employed to support the TACC afloat in conducting these functions.

There is no automated interface between STACCS and CTAPS, or STACCS and JMCIS. STACCS does not provide A2C2 information. The AOC or TACC and BCE staff must now rely on the manual exchange of data as a basis for operational decisions. This exchange is supported by the manual processing of information in either non-magnetic or magnetic media when available.

The Army STACCS must interface with both the Air Force CTAPS and Navy JMCIS to provide the timely exchange of vital operational and airspace management information. It is the objective of the Army and the Air Force to link CTAPS in the AOC with the BCE STACCS at the theater level, and to link CTAPS in the Air Support Operations Center (ASOC) with the maneuver control system (MCS) at corps. Currently, the BCE is not authorized any automation or communications equipment; the Air Force provides virtually everything to it. Local procurement by the 1st Battlefield Coordination Detachment (BCD) has provided lap-top computers and/or PC-based work-stations as "work-around" solutions to data dissemination requirements.

RECOMMENDATIONS:

- That the automation and communications requirements and associated support equipment of the BCE be defined and documented in requirements and authorization documents.
- That MCS devices be provided to the BCE pending fielding of STACCS.

ACTIONS/AGENTS:

- Define and document BCE automation and communications requirements: CAC,CD (Lead); USASIGCEN, 1st BCD (Assist)
- Acquire MCS devices for BCE: CAC,CD (Lead); PM OPTADS (Assist).

RESOURCES:

- Funding is required to provide communications/automation capabilities to the BCE to more effectively support coordination of the air and land battle.
- Funding currently identified for Army automation requirements must be reviewed and higher priority given to BCE needs.

MILESTONES:

- Define and document requirements: Mar 94
- Provide MCS equipment to BCE: Dec 93.

ISSUE: MATERIEL - 5

TITLE: LACK OF REAL-TIME POSITION LOCATION INFORMATION CAPABILITIES TO EFFECTIVELY MANAGE AIRSPACE

DATE: 1 Sep 1993

NUMBER: M-5 (D-1 and M-2)

ECHELON(S): Echelons corps and below (ECB)

BATTLEFIELD FUNCTIONAL AREA(S): Maneuver, Fire Support, Air Defense, Intelligence and Electronic Warfare, and Combat Service Support.

TIME FRAME(S): Near-term

ISSUE: Do maneuver commanders at corps and division require real-time positional information for airspace management?

BACKGROUND: Success on the battlefield depends, in part, on how effectively the airspace over that battlefield is used. Army commanders, staffs, and airspace users employ an array of standard operating procedures (SOPs) to assign responsibility; ensure conformity; describe and illustrate the maneuver concept; maintain separation of the force; concentrate effort; coordinate fires with maneuver; and assist in C2 of the forces. When SOPs are incorporated with airspace control measures, Army forces have the means to control maneuver of Army airspace users in the area of operations.

At ECB, the existing A2C2 system depends on strict adherence to SOPs, and position reporting requirements between users and airspace managers. It also requires reservations of large blocks of airspace for extensive periods. As the number of users and frequency of use increase, deconfliction requirements become more and more challenging. The current A2C2 system employed at corps

and below lacks a real-time position location information capability.

The manual coordination requirements of the existing system are too cumbersome to respond effectively to the commander as operation tempos increase -- as is anticipated in support of FORCPAC2. The post-cold war battlefield of the immediate future will, because of equipment available, use a mix of analog and digital data systems to increase the efficiency of airspace management at ECB. Airspace management organizations will also use digital data systems. Digitization will improve situational awareness by providing these organizations with a capability to use position location information to support their airspace management function.

DISCUSSION: Advantages afforded by digital technology and the global positioning system (GPS) suggest a means to significantly reduce or eliminate the communications and adherence problems associated with the A2C2 system as it is currently utilized at corps and below. As a first step, fielding a real-time position location system in Army aircraft and other airspace user systems will contribute significantly to faster deconfliction of airspace and prevention of fratricide by increasing the commander's situational awareness. Once real-time location information of airspace users is available to the commander, it will significantly reduce or eliminate procedural restrictions and the requirements for adherence to detailed SOPs. Commanders will have greater flexibility in combining and coordinating simultaneous employment of systems at decisive points and times in the battle. Employment of such a system also entails organizational changes to equip and staff A2C2 elements with an automated capability to monitor, receive, process, and display the positional information for airspace management. This system enhances --

- Command and control
- Airspace utilization
- Deconfliction
- Prevention of fratricide.

RECOMMENDATIONS:

- Identify the equipment requirements necessary to support an A2C2 system based on real-time position information
- Develop requirements to equip Army airspace users with position/location devices capable of transmitting automated information to the airspace information center (AIC) at corps and division
- Develop the supporting common software capability to integrate inputs from all airspace users in a real-time environment.

ACTIONS/AGENTS:

- Determine if the maneuver commanders at corps and division have an airspace management requirement for real-time position information. CAC,CD (Lead); CGSC, USAAVNC, USAARMC, USAIC, USAFAS, USAADAS, USAIC&FH (Assist).
- If the commanders have an airspace management requirement for real-time position location:

  - Identify the commander's requirements in related doctrinal and materiel development documentation: CAC,CD (Lead); CGSC, USAAVNC, USAARMC, USAIC, USAFAS, USAADAS, USAIC&FH (Assist).
  - Document equipment requirements necessary to execute the revised doctrine in appropriate tables of organization and equipment (TOEs): CAC,CD (Lead); CGSC, USAAVNC, USAARMC, USAIC, USAFAS, USAADAS, USAIC&FH (Assist).

RESOURCES:

- Determine commanders requirement for real-time position location information: estimated 130 man-days
- Identify requirements in related documentation: estimated 240 man-days
- Develop TOE incorporating resources supporting real-time position location implementation: estimated 240 man-days.

MILESTONES:

- Determine real-time position location requirements: Mar 94
- Incorporate changes in doctrinal and materiel developments documents: Oct 95
- Input required changes to TOEs: Mar 96.

ISSUE: ALL

TITLE: INCORPORATE A2C2 ISSUES ACROSS ALL BATTLE LABS **DATE:** 1 Sep 1993

NUMBER: D-1, 2, 3; T-1, 2, 3; O-1, 2, 3; M-1, 2, 3, 4, 5

ECHELON(S): Echelons above corps (EAC) and echelons corps and below (ECB)

BATTLEFIELD FUNCTIONAL AREA(S): Maneuver, Fire Support, Air Defense, Intelligence and Electronic Warfare, and Combat Service Support.

TIME FRAME: Midterm

ISSUE: There is a need to incorporate A2C2 issues in all of the battle labs.

BACKGROUND: The US Army Training and Doctrine Command (TRADOC) Battle Labs were established in May 1992 to develop battlefield capabilities for a force projection Army. Tied to evolving battlefield dynamics and concepts, and the new warfighting doctrine Field Manual (FM) 100-5, *Operations*, battle labs use experimentation via simulation and prototypes to assist in defining requirements in the areas of doctrine, training, leader development, organization, materiel, and soldier (DTLOMS). Resource realities curtail most materiel development new starts, so the battle labs primarily focus on technology insertions with their respective battle dynamics.

The Enhanced Concept Based Requirements System (ECBRS) requires --

- Branches and proponents to develop concepts and to integrate vertically

- Battle labs to develop concepts and to integrate horizontally within battle dynamics
- Headquarters (HQ), TRADOC, to develop overarching concepts and integrate horizontally across the battlefield.

ECBRS also requires proponents to prepare assessments providing their vision, required capabilities and DTLOMS strategies, and to submit each such assessment to the battle labs and HQ, TRADOC.

The last A2C2/Air Traffic Service (ATS) conference (February 1993) generated a concern that A2C2 must be integrated across the entire spectrum of battle labs, which include --

- Battle command
- Mounted battlespace
- Dismounted battlespace
- Early entry, lethality, and survivability
- Combat service support
- Depth and simultaneous attack.

DISCUSSION: An approved A2C2 concept is required before each proponent can begin to integrate A2C2 into its warfighting capabilities. A2C2 has an effect on, and is the responsibility of, more than a single proponent of a single headquarters. The A2C2 concept must be integrated within each of the battlefield dynamics as well as across the entire battlefield.

RECOMMENDATIONS:

- ECBRS and Louisiana Maneuvers (LAM) must fully incorporate the A2C2 concept.
- That each branch or proponent review the A2C2 concept, prepare its own concept, and assess its DTLOMS impact.

- That each battle lab review the A2C2 concept as it affects the labs specific battle dynamic; incorporate A2C2 into its battle dynamic concept where applicable; and assess the impact of A2C2 on the DTLOMS domains.
- That HQ, TRADOC review the A2C2 concept, prepare an overall concept, and ensure that each battle lab has considered A2C2 in its battlefield capabilities assessment.

ACTIONS/AGENTS:

- Battle Command Battle Lab (BCBL), (Lead); all other labs (Assist)
- See issues D-1, D-2, and D-3.

RESOURCES: see issues D-1, D-2, and D-3.

MILESTONES: see issues D-1, D-2, and D-3.

ANNEX B
ACRONYMS

A2C2 ACTION PLAN
ANNEX B

Acronyms

A2C2	Army Airspace Command and Control
AADC	Area Air Defense Commander
AAGS	Army Air Ground System
AAWC	Antiair Warfare Commander
ABC2	Airborne Command and Control
ABCCC	Airborne Battlefield Command and Control Center
ABIC	Army Battlefield Interface Concept
ABMOC	Air Battle Management Operations Center
AC	Active Component
AC2MP	Army Command and Control Master Plan
ACA	Airspace Control Authority/Airspace Coordination Area
ACC	Airspace Control Center/Air Combat Command
ACCS	Army Command and Control System
ACE	Aviation Combat Element
ACO	Airspace Control Order
ACP	Airspace Control Plan
ACR	Armored Cavalry Regiment
ACUS	Area Common User System
AD	Air Defense
ADA	Air Defense Artillery
ADALO	Air Defense Artillery Liaison Officer
ADCO	Air Defense Coordination Officer
ADDS	Army Data Distribution System
ADJ	Adjacent
ADLER	German Field Artillery Control System
ADP	Automatic Data Processing
AEB	Aerial Exploitation Battalion
AEW	Airborne Early Warning
AF	U.S. Air Force
AFAC	Airborne Forward Air Controller
AFATDS	Advanced Field Artillery Tactical Data System
AFFOR	Air Force Forces
AGOS	Air Ground Operations School
AH-64	Attack Helicopter, Model 64
AHS	Academy of Health Sciences
AI	Air Interdiction
AIC	Airspace Information Center
ALE	Automatic Link Establishment
ALO	Air Liaison Officer
ALOC	Administrative-Logistics Center
ALSA	Air Land Sea Applications Center
AME	Air Mobility Element
AMLS	Airspace Management Liaison Section
AMPS	Automated Mission Planning System

ANBACIS	Automated Nuclear, Biological, and Chemical Information System
ANCOC	Advanced NCO Course
ANGLICO	Air/Naval Gunfire Liaison Company
AO	Area of Operations
AOC	Air Operations Center
AQF	Advanced Quick Fix
ARCENT	Army Central Command
ARFOR	Army Forces
ARI	Army Research Institute
ARLO	Air Reconnaissance Liaison Officer
ARTY	Artillery
ASAS	All-Source Analysis System
ASI	Additional Skill Identifier
ASOC	Air Support Operations Center
ASUWC	Antisurface Warfare Commander
ASWC	Antisubmarine Warfare Commander
ATACMS	Army Tactical Missile System
ATC	Air Traffic Control
ATCA	Air Traffic Control Activity
ATCCS	Army Tactical Command and Control System
ATHS	Airborne Target Handover System
ATNAVICS	Air Traffic Navigation, Integration, and Control System
ATO	Air Tasking Order
ATS	Air Traffic Service
AUSTACCS	Australian Tactical Command and Control System
AVN	Aviation
AWACS	Airborne Warning and Control System
AWIS	Army WWMCCS Information System
B2C2	Battalion and Below Command and Control
BATES	Battlefield Artillery Target Engagement System (United Kingdom Fire Support System)
BBS	Brigade/Battalion Simulation
BCBL	Battle Command Battle Lab
BCD	Battlefield Coordination Detachment
BCE	Battlefield Coordination Element
BCTP	Battle Command Training Program
BDE	Brigade
BFA	Battlefield Functional Area
BN	Battalion
BOS	Battlefield Operating System
BSC	Battle Staff Course
C2	Command and Control
C2FAA	Command and Control Functional Area Assessment
C2FMO	Command and Control for Mobile Operations
C2V	Command and Control Vehicle
C2W	Command and Control Warfare
C3I	Command, Control, Communications, and Intelligence
C4I	Command, Control, Communications, Computers, and Intelligence
CA	Counter Air/Combat Arms

CAC	U.S. Army Combined Arms Command
CAC,CD	CAC, Combat Developments
CAC-T	CAC-Training
CAC2	Combined Arms Command and Control
CAF	Combat Air Force
CAFMS	Computer Aided Force Management System
CAL	Center for Army Leadership
CAP	Combat Air Patrol
CAS	Close Air Support
CAS3	Combined Arms and Services Staff School
CASCOM	U.S. Army Combined Arms Support Command
CATA	Combined Arms Training Activity
CBS	Corps Battle Simulation
CCIR	Commander's Critical Information Requirement
CCT	Combat Control Team
CDR	Commander
CECOM	Communications-Electronics Command
CFL	Coordinated Fire Line
CGS	Common Ground Station
CGSC	Command and General Staff College
CGSOC	Command and General Staff Officer Course
CH	Common Hardware
CHS	Common Hardware Software
CIC	Combat Information Center
CM&D	Collection, Management, and Dissemination
CMISE	Corps Military Intelligence Support Element
CMTC	Combat Maneuver Training Center
CNR	Combat Net Radio
CO	Company
COC	Combat Operations Center
CONUS	Continental United States
COSCOM	Corps Support Command
CP	Command Post
CRC	Control and Reporting Center
CRP	Control and Reporting Point
CS	Combat Support
CSAR	Combat Search and Rescue
CSS	Combat Service Support
CSSCS	CSS Control System
CSSE	Combat Service Support Element
CTAPS	Contingency TACS Automated Planning System
CTC	Combat Training Center
CTF	Combined Task Force
CTAPS	Contingency TACS Automated Planning System
CTT	Commander's Tactical Terminal
CV	Commander's Vehicle
DA	Department of the Army
DASC	Direct Air Support Center
DASC-A	Direct Air Support Center-Airborne
DCS	Defense Communications System
DCSOPS	Deputy Chief of Staff, Operations
DDN	Defense Data Network

DISCOM	Division Support Command
DIV	Division
DNVT	Digital Nonsecure Voice Telephone
DOD	Department of Defense
DS	Direct Support
DTLOMS	Doctrine, Training, Leader Development, Organization, Materiel, and Soldier
EAC	Echelons Above Corps
ECB	Echelon Corps and Below
ECBRS	Enhanced Concept Based Requirements System
EHF	Extremely High Frequency
ELM	Element
ENGR	Engineer
EPLRS	Enhanced Position Location Reporting System
EW	Electronic Warfare
EW/C	Early Warning and Control
FAAD	Forward Area Air Defense
FAADS	Forward Area Air Defense System
FAADC2I	Forward Area Air Defense Command, Control, and Intelligence
FAC	Forward Air Controller
FAC-A	Forward Air Controller-Airborne
FACP	Forward Air Control Post
FARP	Forward Arming and Refueling Point
FAST	Forward Area Shelterized Terminal
FDC	Fire Direction Center
FFA	Free Fire Area
FH	Frequency Hopping
FIST	Fire Support Team
FLC	Force Level Control
FLI	Force Level Information
FLO	Fighter Liaison Officer
FLOT	Forward Line of Own Troops
FM	Frequency Modulation/Field Manual
FMF	Fleet Marine Force
FORSCOM	US Army Forces Command
FORCPAC2	Force Projection Army Command and Control
FS	Fire Support
FSCC	Fire Support Coordination Center
FSCL	Fire Support Coordination Line
FSCOORD	Fire Support Coordination or Coordinator
FSE	Fire Support Element
FSO	Fire Support Officer
FSS	Fire Support Section
FY	Fiscal Year
GBCS	Ground Based Common Sensor
GCE	Ground Combat Element
GLO	Ground Liaison Officer
GPF	Ground Processing Facility
GPS	Global Positioning System
GRCS	Guardrail Common Sensor
GS	General Support

GSM	Ground Station Module
HELO	Helicopter
HEROS	German Command and Control System
HF	High Frequency
HHC	Headquarters and Headquarters Company
HIMAD	High-to-Medium Altitude Air Defense
HMMWV	High Mobility Multipurpose Wheel Vehicle
HQ	Headquarters
ICAC2	Integrated Combat Airspace Command and Control
IAW	In Accordance With
IEW	Intelligence and Electronic Warfare
IFF	Identification Friend or Foe
IHFR	Improved High Frequency Radio
INFO	Information
INTEL	Intelligence
IPR	In-Process Review
IVIS	Inter-Vehicular Information System
JACC	Joint Airspace Control Center
JAOC	Joint Air Operation Center
JP	Joint Publication
JCACC	Joint Combat Airspace Command and Control Course
JCS	Joint Chiefs of Staff
JFACC	Joint Force Air Component Commander
JFC	Joint Force Commander
JFCC	Joint Firepower Control Course
JFKSWC	U.S. Army John F Kennedy Special Warfare Center
JMCIS	Joint Maritime Command Information System
JFLCC	Joint Forces Land Component Commander
JOC	Joint Operations Center
JP	Joint Publication
JPO	Joint Project Office
JPS	Joint Precision Strike
JRTC	Joint Readiness Training Center
JSTARS	Joint Surveillance Target Attack Radar System
JTADS	Joint TADIL-A Distribution System
JTCB	Joint Target Coordination Board
JTIDS	Joint Tactical Information Distribution System
JUMPS	Joint Uniform Military Pay System
KM	Kilometer
LAADBN	Low Altitude Air Defense Battalion
LAAMBN	Light Anti-Aircraft Missile Battalion
LAM	Louisiana Maneuvers
LCC	Land Component Commander
LFCCIS	Land Forces Command and Control Information System
LNO	Liaison Officer
LNTM	Liaison Team
LO	Liaison Officer
LOG	Logistics
LRSU	Long Range Surveillance Unit
MACOM	Major Command
MAGTF	Marine Air-Ground Task Force
MATCS	Marine Air Traffic Control Squadron

MCC	Marine Component Commander
MCS	Maneuver Control System
MEF	Marine Expeditionary Force
METL	Mission Essential Task List
METT-T	Mission, Enemy, Terrain, Troops Available, and Time Available
MI	Military Intelligence
MLE	Marine Liaison Element
MLRS	Multiple Launch Rocket System
MMC	Materiel Management Center
MMLS	Mobile Microwave Landing System
MNS	Mission Needs Statement
MOS	Military Occupation Specialty
MOU	Memorandum of Understanding
MSE	Mobile Subscriber Equipment
MSRT	Mobile Subscriber Radiotelephone Terminal
MTCCS	Marine Tactical Command and Control System
MTP	Mission Training Plan
NATO	North Atlantic Treaty Organization
NCC	Navy Component Command
NCO	Noncommissioned Officer
NFA	No Fire Area
NGREP	Naval Gunfire Representative
NLE	Navy Liaison Element
NLOS	Non-Line-of-Sight
NOE	Nap-of-the-Earth
NSC	National Simulation Center
NSFS	Naval Surface Fire Support
NTC	National Training Center
NTCS-A	Naval Tactical Control System - Afloat
NVD	Night Vision Device
OAC	Officer Advanced Course
ODSS	Operation Desert Shield/Storm
OH-58D	Observation Helicopter, Model 58D
OPLAN	Operations Plan
OPORD	Operations Order
OPTADS	Operational Tactical Data Systems
ORGD	Organization Directorate
OSA	Operational Support Airlift
PCC	Pre-command Course
PCWC2	Post-Cold War Command and Control
PDC	Professional Development Course
PEO	Program Executive Officer
PERSCOM	Personnel Command
PERS	Personnel
PLT	Platoon
PM	Program Manager/Project Manager
POM	Program Objective Memorandum
RATO	Rocket Assisted Takeoff
RATT	Radio Teletypewriter
RC	Reserve Component
RDD	Requirements Definition Documents

RECCE	Reconnaissance
RFA	Restrictive Fire Area
RFL	Restrictive Fire Line
ROE	Rules of Engagement
RPV	Remotely Piloted Vehicle
RRP	Rapid Refuel Point
SAAFR	Standard Use Army Aircraft Flight Route
SACC	Supporting Arms Coordination Center
SACRA	French Command and Control System
SAILS	Standard Army Intermediate Level Supply System
SALT	Supporting Arms Liaison Team
SATCOM	Satellite Communications
SCAMP	Single Channel Anti-Jam Manportable Terminal
SEC	Section
SEMA	Special Electronic Mission Aircraft
SEWC	Space and Electronic Warfare Commander
SHORAD	Short Range Air Defense
SIDPERS	Standard Installation/Division Personnel System
SIF	Selective Identification Feature
SIGCEN	U.S. Army Signal Center
SINCGARS	Single Channel Ground and Airborne Radio System
SLAR	Side Looking Airborne Radar
SMART-T	Secure Mobile Anti-Jam Reliable Tactical-Terminal
SOF	Special Operations Forces
SOFCOORD	Special Operations Forces Coordinator
SOP	Standing Operating Procedure
SPINS	Special Instructions
SPT	Support
SQDN	Squadron
STACCS	Standard Theater Army Command and Control System
STAMIS	Standard Army Management Information System
SWC	Surface Warfare Command
SWOT	Senior Warrant Officer Training
TA	Theater Army
TAB	Target Acquisition Battery
TAC	Tactical Aviation Control or Tactical Command Post
TAC-A	Tactical Air Coordinator-Airborne
TACC	Tactical Air Control Center (USN) or Tactical Air Command Center (USMC)
TACCIMS	Theater Automated Command and Control Information Management System
TACP	Tactical Air Control Party
TACS	Theater Air Control System
TACSAT	Tactical Satellite
TADC	Tactical Air Direction Center
TAF	Tactical Air Force
TAIS	Tactical Airspace Integration System
TALCE	Tanker Airlift Control Element
TAMMIS	The Army Maintenance Management Information System
TAOC	Tactical Air Operations Center
TDY	Temporary Duty
TENCAP	Tactical Exploitation of National Capabilities

TIBS	Tactical Information Broadcast Service
TOC	Tactical Operations Center
TOE	Table of Organization and Equipment
TPN	Tactical Packet Network
TRADOC	U.S. Army Training and Doctrine Command
TRAP	Transmit Receive Equipment and Associated Applications
TRITAC	Tri-Services Tactical Communications (Joint)
TRIXS	Tactical Receiver Intelligence Exchange System
TSP	Training Support Package
TTCS	Tactical Terminal Control System
TTP	Tactics, Techniques, and Procedures
UAV	Unmanned Aerial Vehicle
UH-60	Utility Helicopter, Model 60
UHF	Ultrahigh Frequency
UIR	User Interface Requirements
USAAVNC	US Army Aviation Center
USAARMC	US Army Armor Center
USACLMS	US Army Chemical School
USAF	US Air Force
USAFAS	US Army Field Artillery School
USCGC2	US Coast Guard Command and Control
USAADAS	US Army Air Defense Artillery School
USAIC	US Army Infantry Center
USAIC&FH	US Army Intelligence Center and Fort Huachuca
USASIGCEN	US Army Signal Center
USASMA	US Army Sergeants Major Academy
USMTF	US Message Text Format
USN	US Navy
VHF-AM	Very High Frequency - Amplitude Modulation
VHF-FM	Very High Frequency - Frequency Modulation
WAVELL	United Kingdom Command and Control System
WOC	Wing Operations Center
WWMCCS	Worldwide Military Command and Control System

ANNEX C
DEFINITIONS AND TERMS

A2C2 ACTION PLAN
ANNEX C

Definitions

Air Defense (AD): 1. (North Atlantic Treaty Organization [NATO] Standardization Agreement AAP-[R]): All measures designed to nullify or reduce the effectiveness of hostile air action. 2. (Joint Chiefs of Staff [JCS] Publication [Pub] 1-02): All defensive measures designed to destroy attacking enemy aircraft or missiles in the earth's envelope of atmosphere, or to nullify or reduce the effectiveness of such attack. 3. (US Army Training and Doctrine Command [TRADOC] Regulation [Reg] 11-15): Measures designed to nullify or reduce the effectiveness of threat employment to aerial systems for attack, surveillance, or any other reason.

Airspace Control Authority (ACA) (JCS Pub 1-02): The commander designated to assume overall responsibility for the operation of the airspace control system in the airspace control area.

Airspace Control Boundary (JCS Pub 1-02): The lateral limits of an airspace control area, airspace control sub-area, high density airspace control zone or airspace restricted area.

Airspace Control Center (ACC) (Joint Pub 3-52 [Test]): The airspace control authority's primary airspace control facility, including assigned service, host-nation, and/or allied personnel and equipment.

Airspace Control in the Combat Zone (Joint Pub 3-52 [Test]): A service provided to increase combat effectiveness by promoting the safe, efficient and flexible use of airspace. Airspace control is provided in order to permit greater flexibility of operations, while authority to approve, disapprove or deny combat operations is vested only in the operational commander. Also referred to as combat airspace control and airspace control.

Airspace Control Measures (JCS Pub 1-02): Rules, mechanisms, and directions governed by joint doctrine and defined by the airspace control plan that control the use of airspace of defined dimensions. All control measures can be graphically depicted. Examples of control measures are low-level transit routes, high-density airspace control zones, aircraft check points, and standard use Army aircraft flight routes.

Airspace Control Order (ACO) (Joint Pub 3-52 [Test]): An order implementing the airspace control plan that provides the details of the approved requests for airspace control measures. It

is published either as part of the air tasking order or as a separate document.

Airspace Control Plan (ACP) (Joint Pub 3-52 [Test]): The document providing specific planning procedures for the airspace control system for a particular area of operations.

Airspace Control System (JCS Pub 1-02): An arrangement of those organizations, personnel, policies, procedures and facilities required to perform airspace control functions.

Airspace Management Liaison Section (AMLS) (JCS Pub 1-02): An agency staffed with representatives from all components involved, responsible to the airspace control authority for planning, coordinating, and integrating activities related to airspace control.

Air Tasking Order (ATO) (Air Ground Operations School [AGOS] Joint Combat Airspace Command and Control [JCACC] Course Workbook): The ATO is the document that implements tactical air support. It tasks assigned and attached units to accomplish specific missions in support of the joint force commanders' objectives. The ATO is published daily by the combat plans division of the air operations center and provides sufficient detail to enable mission aircrews and theater air control system (TACS) elements to execute assigned missions.

Air Traffic Control Service (JCS Pub 1-02): A service provided for the purpose of preventing collisions between aircraft, and between aircraft and obstructions, and expediting and maintaining an orderly flow of air traffic.

Area Air Defense Commander (AADC) (Joint Pub 3-52 [Test]): Within a unified command, subordinate unified command or joint task force, the commander will assign overall responsibility for air defense to a single commander. Normally, this will be the component commander with the preponderance of air defense assets to be used and the ability to assume that responsibility. Representation from the other components involved will be provided, as appropriate, to the area air defense commander's headquarters.

Army Airspace Command and Control (A2C2) (Field Manual [FM] 100-103): Those actions that ensure the synchronized use of airspace and enhance the command and control of those forces using airspace. Includes organizations, personnel, facilities, procedures required to perform the airspace control function. When linked with the airspace control authority by communications, standardized procedures, and liaison, becomes part of the theater integrated airspace control system.

Army Command and Control System (ACCS) (FM 25-1): The aggregate means by which Army commanders employ and sustain

military forces in a theater of operations. It consists of organizations (comprised of personnel, facilities, equipment, communications, and other materiel), training (standards, standing operating procedures [SOPs]) and command and control (C2) doctrine (e.g., processes, organization of staffs and command posts [CPs]).

Army Tactical Command and Control System (ATCCS) (Army Command and Control Master Plan (AC2MP), 1990): That portion of ACCS which functions at corps level and below, and which interfaces at echelons above corps with the Theater Army C2 System and the joint and/or combined C2 system.

Automation: 1. (JCS Pub 1-02): The implementation of processes by automatic means. 2. The conversion of a procedure, a process, or equipment to automatic operation. 3. (Army Regulation [AR] 25-1): The use of computers to store, retrieve, manipulate, and control data. This includes the collection; processing, display, and output of data to produce or communicate information.

Battlefield Operating Systems (BOS) (TRADOC Regulation [Reg] 11-15): The major functions occurring on the battlefield, each consisting of systems employed to successfully execute operations by the total Army. The seven BOS are: maneuver, fire support, air defense, C2, intelligence, mobility, survivability, and combat service support.

Broadcast Intelligence and Weather (Force Projection Army Command and Control Action Plan): A multitude of space-borne and airborne sensor platforms currently broadcasting information. These include national, joint, theater, operational, weather, and tactical systems. The value added is in terms of optimization; making full use of the suite of these sensors to paint a common picture and disseminate it in near real-time to the warfighter.

Close Air Support (CAS) (AGOS JCACC Workbook): Air action against hostile targets which are in close proximity to friendly forces and which require detailed integration of each air mission with the fire and movement of those forces.

Combat Airspace Control (AGOS JCACC Workbook): A service provided within the combat zone to contribute to the maximization of combat effectiveness by promoting the safe, efficient, and flexible use of airspace. Airspace control is provided in order to permit flexibility of actions in controlled airspace, while authority to approve, disapprove, or deny combat operations is vested only in the joint force commander.

Combat Control Team (CCT) (AGOS JCACC Workbook): A small group of highly trained Air Force personnel who rapidly deploy and establish assault zones in austere and nonpermissive environments. When assigned to the commander of airlift forces (COMALF) as an

element of the TACS or to the command of the Air Force's special operations forces, CCTs perform control of air traffic, initial placement of enroute and terminal navigation aids, command and control communications, and demolition of obstacles and unexploded ordnance.

Combat Zone (JCS Pub 1-02): 1. That area required by combat forces for the conduct of operations. 2. The territory forward of the Army area boundary. 3. The territory forward of the Army group rear boundary. It is divided into:

A. The forward combat zone, comprising the territory forward of the corps rear boundary.
B. The rear combat zone, usually comprising the territory between the corps rear boundary and the army group rear boundary.

Command and Control System (JCS Pub 1-02): The facilities, equipment, communications, procedures, and personnel essential to a commander for planning, directing, and controlling operations of assigned forces pursuant to missions assigned.

Command and Control for Mobile Operations (C2FMO) (Force Projection Army Command and Control Action Plan): A concept for warfighters that enable them to "battle command" in fast paced scenarios while both he and his forces are mobile; either enroute to, entering, or operating within the battle space. It means warfighters must continuously maintain voice and data contact with subordinate elements, superiors, and flanking elements. They must be "aware" of the enemy situation and their own situation relative to their position and the adjacent unit's position, regardless of the warfighting echelon or phase of the operation. The warfighter must be able to position himself where he can best command as well as respond to changing circumstances.

Command and Control (C2) (JCS Pub 1-02): The exercise of authority and direction by a properly designated commander over assigned or attached forces in the accomplishment of the mission. C2 functions are performed through an arrangement of personnel, equipment, communications, facilities, and procedures employed by a commander in planning, directing, coordinating, and controlling forces and operations in the accomplishment of the mission.

Communications (JCS Pub 1-02): A method or means of conveying information of any kind from one person or place to another.

Communications Zone (COMMZ) (JCS Pub 1-02): Rear part of theater of operations (behind but contiguous to the combat zone) which contains the lines of communications, establishments for supply and evacuation, and other agencies required for the immediate support and maintenance of the field forces.

Condition (TRADOC Pamphlet [Pam] 25-33): That portion of the training objective which describes the situation or environment in which the soldier will perform a specified behavior. Conditions include any pertinent influence upon task performance, environment, equipment, manuals, assistance, or supervision required. The conditions statement of the task summary in the soldier's manuals describes the conditions for actual job performance of the task.

Control and Reporting Center (CRC) (JCS Pub 1-02): An element of the Air Force TACS, subordinate to the air operations center, from which radar control and warning operations are conducted within its area of responsibility.

Control and Reporting Post (CRP) (JCS Pub 1-02): An element of the Air Force TACS, subordinate to the control and reporting center, that provides radar control and surveillance within its area of responsibility.

Critical Task (TRADOC Pam 25-33): A collective or individual task determined to be essential to wartime mission, duty accomplishment, or survivability. Critical individual tasks are trained in the training base and/or unit, and they are reinforced in the unit.

Digitization of the Battlefield (Force Projection Army Command and Control Action Plan): A concept that provides the warfighter an integrated digital information network that supports warfighting systems and assures C2 decision cycle superiority. It prescribes that data should be digitized at the source level with the capability to pass that data to anyone who needs it without requiring anyone to input the data again.

Directed Training (TRADOC Pam 25-33): Training that schools are required to provide by direction from a higher headquarters, e.g., common tasks selected for resident training.

Doctrine (JCS Pub 1-02): Fundamental principles by which the military forces guide their actions in support of objectives. It is authoritative but requires judgment in application.

Fire Support Coordination Line (FSCL) (JCS Pub 1-02): A line established by the appropriate ground commander to insure coordination of fire not under his control but which may affect current tactical operations. The FSCL is used to coordinate fires of air, ground or sea weapons systems using any type of ammunition against surface targets. The FSCL should follow well defined terrain features. The establishment of the FSCL must be coordinated with the appropriate tactical air commander and other supporting elements. Supporting elements may attack targets forward of the FSCL, without prior coordination with the ground force commander, provided the attack will not produce adverse surface effects on, or to the rear of, the line. Attacks against

surface targets behind this line must be coordinated with the appropriate ground force commander.

Fort-to-Port Connectivity (Force Projection Army Command and Control Action Plan): A seamless information network that gives the Army warfighter and his force the ability to freely transfer information or query information sources within the approved architecture on a global basis (global connectivity). It gives the warfighter the same connectivity whether he is at his fort or a distant port.

Forward Line of Own Troops (FLOT) (JCS Pub 1-02): A line which indicates the most forward positions of friendly forces in any kind of military operation at a specific time. The forward line of own troops normally identifies the forward location of covering and screening forces.

Forward/Rearward Command Post (CP) Configuration (Force Projection Army Command and Control Action Plan): An alternative that is currently being studied through the Battle Lab and Louisiana Maneuvers (LAM) processes is the concept of forward and rearward CPs. It contains two zones: the secure area and the combat zone. In the secure area, the rearward CP and the sustaining base CP are relatively safe from high level threats. The rearward CP would be located in the theater where threat levels are low, and of course, threat levels would be non-existent at the home station sustaining base CP in the continental United States (CONUS). In this concept some previously defined main and rear functions are "split" between the rearward CP and the sustaining base CP. The rearward command post synchronizes rear operations within the close and deep operations planned by the forward CP. The sustaining base and rearward CPs are best characterized as information repositories where detailed planning, coordination and analysis occur.

Functional Course (TRADOC Pam 25-33): A course designed to train soldiers in specific skills needed to perform tasks supporting their duty assignment. It may provide training which qualifies soldiers for award of an additional skill identifier, special qualifications identifier, or skill identifier.

Identification, Friend or Foe (IFF) (JCS Pub 1-02): A system using electromagnetic transmissions to which equipment carried by friendly forces automatically responds, for example, by emitting pulses, thereby distinguishing themselves from enemy forces.

Interface: 1. (Allied Data Processing Publication [ADatP]-2[D]): A boundary or common point to two or more entities through which information flow takes place. 2. (JCS Pub 1-02): A boundary or point common to two or more similar or dissimilar C2 systems, sub-systems, or other entities against which or at which necessary information flow takes place. 3. (Army Battlefield

Interface Concept [ABIC]): A boundary, point, or system common to two automated systems through which an exchange of usable information takes place.

Interoperability (JCS Pub 1-02): 1. The ability of systems, units or forces to provide services to and accept services from other systems, units or forces and to use the services so exchanged to enable them to operate effectively together. 2. The condition among communications-electronics systems or items of communications-electronics equipment when information or services can be exchanged directly and satisfactorily between them and/or their users. The degree of interoperability should be defined when referring to specific cases.

Joint and Combined Operations (Force Projection Army Command and Control Action Plan): The US Army's doctrine that applies the principles of war and combat power dynamics to contemporary and anticipated future battlefields within the strategic policy direction of our government. It is inherently a joint doctrine that recognizes the teamwork required of all the services and the extension of the battlefield in time, space, and purpose through all available resources and campaign design. It recognizes that these operations may be combined when conducted by forces of two or more allied nations acting together to accomplish a single mission.

Joint Force (JCS Pub 1-02): A general term applied to a force which is composed of significant elements of the Army, the Navy or the Marine Corps, and the Air Force, or two or more of these services, operating under a single commander authorized to exercise unified command or operational control over joint forces.

Joint Force Air Component Commander (JFACC) (JCS Pub 1-02): The joint force air component commander derives his authority from the joint force commander who has the authority to exercise operational control, assign missions, direct coordination among his subordinate commanders, redirect and organize his forces to ensure unity of effort in the accomplishment of his overall mission. The joint force commander will normally designate a joint force air component commander. The joint force air component commander's responsibilities will be assigned by the joint force commander (normally these would include, but not be limited to, planning, coordination, allocation and tasking based on the joint force commander's apportionment decision). Using the joint force commander's guidance and authority, and in coordination with other Service component commanders and other assigned or supporting commanders, the joint force air component commander will recommend to the joint force commander apportionment of air sorties to various missions or geographic areas.

Leader Development (TRADOC Pam 25-33): The process the Army uses to develop competent, confident leaders. The leader development process is assessment, feedback, additional training

and reinforcement, education, training, experience, and selection for advancement. This cycle occurs in a logical sequence; each step builds on past successes. The cycle also progresses sequentially to challenges of greater scope.

Materiel (JCS Pub 1-02): All items (including ships, tanks self-propelled weapons, aircraft, etc., and related spare parts, and support equipment, but excluding real property, installations, and utilities) necessary to equip, operate, maintain, and support military activities without distraction as to its application for administrative or combat purposes.

Mission Essential Task (FM 25-101): A collective task in which an organization must be proficient to accomplish an appropriate portion of its wartime mission(s).

Mission Essential Task List (METL) (FM 25-101): A compilation of collective mission essential tasks which must be successfully performed if an organization is to accomplish its wartime mission.

Mission Training Plan (MTP) (FM 25-101): Descriptive training document which provides units a clear description of what and how to train to achieve wartime mission proficiency. MTPs elaborate on wartime missions in terms of comprehensive training and evaluation outlines. They provide exercise concepts and related training management aids to assist field commanders in the planning and execution of effective unit training.

Organization (AR 310-25): 1. Any unit; specifically, a larger command composed of two or more smaller units. In this meaning, a military element of a command is an organization in relation to its components and a unit in relation to its higher commands. 2. The definite structure of a military element prescribed by a competent authority such as a table of organization.

Positive Control (JCS Pub 1-02): A method of airspace control which relies on positive identification, tracking and direction of aircraft within an airspace, conducted with electronic means by an agency having the authority and responsibility therein.

Procedure (ADatP-2[D]): A description of a course of action taken for a specific purpose.

Procedural Control (JCS Pub 1-02): A method of airspace control which relies on a combination of previously agreed and promulgated orders and procedures.

Professional Development Course (TRADOC Pam 25-33): A course designed to prepare commissioned officers, warrant officers, or noncommissioned officers to effectively perform the duties required in assignments of progressively greater responsibility.

Proponent School (TRADOC Pam 25-33): A TRADOC school, designated by the Commanding General, TRADOC, to develop and review instructional material which is primary to branch doctrine, combat, or logistic training responsibility.

Remotely Piloted Vehicle (RPV) (JCS Pub 1-02): An unmanned vehicle capable of being controlled from a distant location through a communications link. It is normally designed to be recoverable.

Seamless Communications Architecture (Command, Control, Communications, Computers, and Intelligence [C4I] for the Warrior, 12 Jun 92): In the C4I for the Warrior concept, the Warrior is supported by a fully developed, transparent global C4I infrastructure that provides tailored, fused information via a seamless strategic and tactical connectivity.

Simulation (TRADOC Pam 25-33): Any representation or imitation of reality. Simulating part of the system, simulating the operation of the system, and simulating the environment in which the system will operate are three common types.

Situation Awareness (Force Projection Army Command and Control Action Plan): Focused at battalion task force and lower. The focus of situation awareness is where fratricide is most likely to occur. By integrating Global Positioning System (GPS) with Single Channel Ground and Airborne Radio System [SINCGARS] and storing this information by net, "net" pictures on small displays along with key sets of information at weapons system, platoon, company, and battalion levels can be exchanged automatically.

Split-Based Operations (Force Projection Army Command and Control Action Plan): To support a force projection army, maintaining certain functions at the home base will save lift assets and maintain uninterrupted operations. The intent is to move data in lieu of deploying C2 structure and the supporting sustainment personnel and facilities. Particular application is envisioned in intelligence, logistics, and planning. Split-based support could be either decentralized from a unit's home base, centralized such as intelligence at Fort Huachuca and combat service support at Fort Lee, or a combination of both. It is no longer efficient to move our sophisticated logistics and intelligence data processing centers when they can be tethered to the operational area via seamless automation architectures supported by reliable communications systems.

Standard of Performance (TRADOC Pam 25-33): A statement which establishes a criteria for how well a task or learning objective must be performed. The standard specifies how well, completely, or accurately a process must be performed or product produced. The standard reflects task requirements on the job or learning requirements in the classroom. If a product is standard, it is in terms of accuracy, tolerance, completeness, format, clarity,,

errors, or quantity. If a process is standard, it is in terms of sequence, completeness, accuracy, or speed. Both product and process must be observable and measurable.

Sustainment Training (TRADOC Pam 25-33): The provision of training required to maintain the minimum acceptable level of proficiency required to accomplish a critical task.

Target Population (TRADOC Pam 25-33): The persons for whom the instructional or training materials are designed. Samples from this population are used in evaluating training materials during their development. Also called **target audience**.

Task (TRADOC Pam 25-33): Single unit of specific work behavior with clear beginning and ending points and directly observable or otherwise measurable process, frequently but not always resulting in a product that can be evaluated for quantity, quality, accuracy, or fitness in the work environment. A task is performed for its own sake, that is, it is not dependent upon other tasks, although it may fall in a sequence with other tasks in a duty or job array. A task statement, to be complete, must contain an action verb, an object, and must express the conditions under which the task is performed and the standard which must be met in performance.

Training (TRADOC Pam 25-33): Activities designed to prepare individuals, teams, and units for job and duty performance; the teaching of job skills and knowledge.

Training Materials (TRADOC Pam 25-33): Those materials developed as a result of task and learning analysis that are provided to teach or evaluate a task. They include training extension course, Army correspondence course program, Army training literature program, soldier qualification tests, and other products used to train a task to a prescribed standard as listed in the soldier training publication.

Training Objective (TRADOC Pam 25-33): A statement based on training performance. There are three separate elements which form the structure of the objective: the <u>action</u> which the unit or soldier must be capable of performing; the <u>standard</u> of performance the unit or soldier must meet; and the <u>conditions</u> under which the unit or soldier is expected to perform. Each element expresses a factor essential to the understanding of a performance and specifies capability for accomplishing the training objective after completing a specific block of instruction.

Training Program (TRADOC Pam 25-33): An assembly or series of courses or other requirements which have been organized to fulfill a broad overall training objective.

Training System (TRADOC Pam 25-33): A training system is the combination of all elements of a training program working together to bring about the preparation of personnel to effectively perform their assigned jobs. A training system consists of training hardware, facilities, and personnel subsystems.

Unit Training (TRADOC Pam 25-33): Training (individual, collective, and joint or combined) which takes place outside the Army's institutional base.

Unmanned Aerial Vehicles (UAV) (FM 100-21 [Draft]): A powered, aerial vehicle that does not carry a human operator, uses aerodynamic forces to provide vehicle lift, can fly autonomously or be piloted remotely, can be expendable or recoverable, and can carry lethal or nonlethal payload.

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ANNEX D
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A2C2 ACTION PLAN
ANNEX D

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ANNEX E
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A2C2 ACTION PLAN
ANNEX E

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